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14. ABSTRACT

Center of Excellence (CoE) in STEM Education was established through a partnership between Jackson State University (JSU), Hinds Community College (HCC) and Jackson Public School District (JPSD). Its overarching goal was to develop a STEM pipeline program that will: 1) enhance the STEM academic infrastructure, and 2) mentor students to pursue careers and advanced degrees in STEM disciplines of relevance to the DoD mission. To achieve these goals, important strategic activities (after school tutoring, Saturday academies, summer bridge and summer immersion programs) were implemented to effectively train K-12 students, enhance their skills and

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Report Title

Final Report: Jackson State University (JSU)'s Center of Excellence in Science, Technology, Engineering, and Mathematics Education (CESTEME)

ABSTRACT

Center of Excellence (CoE) in STEM Education was established through a partnership between Jackson State University (JSU), Hinds Community College (HCC) and Jackson Public School District (JPSD). Its overarching goal was to develop a STEM pipeline program that will: 1) enhance the STEM academic infrastructure, and 2) mentor students to pursue careers and advanced degrees in STEM disciplines of relevance to the DoD mission. To achieve these goals, important strategic activities (after school tutoring, Saturday academies, summer bridge and summer immersion programs) were implemented to effectively train K-12 students, enhance their skills and readiness and facilitate their transition into rigorous STEM programs in College. Undergraduate students were engaged in mentoring, tutoring and career development, yearlong research, laboratory rotation and internship activities that sharpened their skills and promoted their progression through the STEM pipeline. Overall, the program made a tremendous impact on STEM education. 100% of the 25 K-12 DoD fellows graduated in the top 10% of their class, and are now pursuing STEM degrees in college. Over 80 other K-12 students participated in our Summer Bridge Program and more that 70% chose to pursuit STEM majors. Thirteen of the 16 DOD Scholars from JSU graduated in 4 years. 61% of graduates are now enrolled in graduate schools pursuing MS or doctorate degrees. Eleven of the 18 HCC DoD Scholars transitioned in BS degree programs. Math, Biology, and Physics courses were redesigned to strengthen our 2+2 articulation agreements with HCC. Both education and research infrastructure were enhanced, and leverage from the DoD-CoE also helped JSU to obtain a new grant from DoEd under the First in the World Program, to implement new strategies to improve teaching and learning in STEM.

Enter List of papers submitted or published that acknowledge ARO support from the start of the project to the date of this printing. List the papers, including journal references, in the following categories:

(a) Papers published in peer-reviewed journals (N/A for none)

Received	Paper

TOTAL:

Number of Papers published in peer-reviewed journals:

(b) Papers published in non-peer-reviewed journals (N/A for none)

Received	Paper

TOTAL:

Number of Papers published in non peer-reviewed journals:

(c) Presentations

The following papers were presented at the International Symposium Series on Recent Advances in Environmental Health Research. Jackson Convention Complex, Jackson, Mississippi.

Garlic Treatment-Induced Growth arrest and cell death of Human leukemia (HL-60) Cells
DeBorah Luckett (Jim Hill high school), James Bennett (Provine high school), Clement G. Yedjou (Jackson State University), and Paul B. Tchounwou (Jackson State University)

Cellular Toxicity of Lead Nitrate to Human Promyelocytic Leukemia (HL-60) Cells
Sara Bibbs (Jim Hill high school), Tyler Lowe (Provine high school), Clement G. Yedjou (Jackson State University), and Paul B. Tchounwou (Jackson State University)

Novel Approach to Detect Viable and Dead Cells by Propidium Iodione after Lead Treatment
Tanjanikia Mckinney (Jim Hill high school), Clement G. Yedjou (Jackson State University), and Paul B. Tchounwou (Jackson State University)

Arsenic Trioxide: A Potent DNA Damaging Anticancer Drug in the Management of Acute Promyelocytic Leukemia
Tammy Cox (Jim Hill high school), Clement G. Yedjou (Jackson State University), and Paul B. Tchounwou (Jackson State University)

Novel-Natural Product Induced Cytotoxic damage and activation of caspase-3 in Human Leukemia (HL-60) Cells
Imani Nelson (Jackson State University), Chucks Agusiegbe (Jackson State University), Clement Yedjou (Jackson State University), and Paul B. Tchounwou (Jackson State University)

Low Dose Mercury Exposures in Human Renal Proximal Tubular (HK-2) Cells
Devin Stewart (Jackson State University), Jheena Victorian (Jackson State University), and Dwayne Sutton (Jackson State University)

Hardware in the Loop Simulator for Multi Agent Unmanned Aerial Vehicle Environment
Jordan J. Barber (Jackson State University), and Kamal S. Ali (Jackson State University)

Arsenic Trioxide Based Drug-Induced Cytotoxic Effects to Human Leukemia (HL-60) Cells
Triniti Taylor (Lanier high school), Tullow Burrow (Murrah high school), Clement G. Yedjou (Jackson State University), and Paul B. Tchounwou (Jackson State University)

Investigating the Benefits of Utilizing Mobile Devices as Student Response Systems In Freshman Level Mathematics Courses
Ms. Shontrice N. Garrett (Jackson State University), Dr. Jana Talley (Jackson State University) and Lecretia Buckley (Jackson State University) (Faculty Advisors)

Determination of the Organic Pollutant Composition in the Soil and Sediments Collected within Jackson, Mississippi
Tometrick Hemmingway (Jackson State University), Marek Gołębiowski (Jackson State University), Monika Paszkiewicz (Jackson State University), Bartłomiej Wysocki (Jackson State University), Piotr Stepnowski (Jackson State University), Danuta Leszczyńska (Jackson State University)

Correlation Analysis on NBA Data
Trenton Miller (Jackson State University), David Muhammad (Jackson State University) and Xing Yang (Jackson State University)

Mobile Devices as a Component of A Student Response System for STEM Majors
Shontrice N. Garrett (Jackson State University), Jana Talley (Jackson State University), Lecretia Buckley (Jackson State University), Jessica Buck (Jackson State University)

Extract of a Natural Product: A New Promising Candidate for Cancer Drug Discovery
Alexis Mosley (Jackson State University), Myeisha Fountain (Jackson State University), Clement Yedjou (Jackson State University), and Paul B. Tchounwou (Jackson State University)

Lead Nitrate Induced Cell Cycle Arrest in Human Leukemia (HL-60) Cells
Hervey Tchounwou (Jackson State University) and Clement Yedjou (Jackson State University)

Uptake and Effects of Nickel Oxide and Cobalt Oxide Nanoparticles on Artema
Terriona Cowan (Jackson State University), Mehmet Ates (Jackson State University & Tunceli University), Zikri Arslan (Jackson State University) and Ibrahim Farah (Jackson State University)

Comparison of Heavy Metal and Radionuclide Profiles in Farm-Raised and Wild Caught Fish in the Mississippi River

Jeremy White (Jackson State University) Zikri Arslan (Jackson State University), and Jermiah Kiran Billa (Alcorn State University)

TNF-Induced Necropotosis in Human Renal Proximal Tubular (HK-2) Cells
Dwayne J. Sutton (Jackson State University), Kenneth Ndebele (Jackson State University), Devin Stewart (Jackson State University), Jheena Victorian ((Jackson State University) Whitney Sephus (Jackson State University), Pablo Williams (Jackson State University), Victoria Williams (Jackson State University), Clement Yedjou (Jackson State University) Erica Dugo (Jackson State University), Christian Rogers (Jackson State University), Ebonie Butler-Cheeks (Jackson Public Schools District), and Betty Davis (Jackson Public Schools District)

The following paper was presented at the 64th National Conference for 2013 Undergraduate Women in Mathematics in Lincoln, Nebraska; at the MATHFEST 2014 hosted by the Mathematical Association of America in Portland, Oregon, August 6-8, 2014; and also at the Joint Mathematics Conference in San Antonio, TX, January 10-13, 2015.

Mobile Devices in the Classroom: Promoting Mathematical Discourse."
Shontrice Garrett (Jackson State University) and Jana Talley (Jackson State University)

The following paper was presented at the 2014 National Science Teachers Associations (NSTA) Conference, Boston, MA - Special session arranged by the Association of Multicultural Science Education (AMSE),

Enhancing a STEM Culture through Research Teams.
Preston Robinson (Jackson Public Schools District), Tammy Cox (Jackson Public Schools District), David Washington (Jackson Public Schools District), Tanjanika McKenney (Jackson Public Schools District), Ebonie Butler-Cheeks (Jackson Public Schools District) and Betty Davis (Jackson Public School District)

Number of Presentations: 19.00

Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received	Paper

TOTAL:

Number of Non Peer-Reviewed Conference Proceeding publications (other than abstracts):

Peer-Reviewed Conference Proceeding publications (other than abstracts):

Received	Paper

TOTAL:

Number of Peer-Reviewed Conference Proceeding publications (other than abstracts):

(d) Manuscripts

Received Paper

TOTAL:

Number of Manuscripts:

Books

Received Book

TOTAL:

Received Book Chapter

TOTAL:

Patents Submitted

Patents Awarded

Awards

One hundred percent of our K-12 DoD Scholars graduated from high school. Eleven of these twenty-five students ranked in the top ten percent of their class. Karanja Matory, Alexis Shakespeare (Valedictorian) and Simeon Taylor (Salutatorian) represented Provine High School. DeBorah Luckett (Valedictorian), Sara Bibbs (Salutatorian) and Jaylen Davis represented Jim Hill High School.Kelsey Figures and LaShayla Yates represented Wingfield High School. Courtney Brent, Kira Rollins and Triniti Taylor represented Lanier High School.

Carah Young of Wingfield High School was featured in Jackson Free Press' "Amazing Teens 2015" article. The article highlighted her academic and social accomplishments, as well as her roles in the National Honor Society, student body and Reserve Officer Training Corps (ROTC). Ms. Young plans to pursue a career in biometric engineering.

Karanja Matory of Provine High School and Anthony Hunter of Lanier High School were both featured on WAPT News Channel 16's Scholar of the Week. This commercial highlighted their academic, athletic and social success. Mr. Matory and Mr. Hunter are both currently enrolled at Jackson State University.

Two of the CESTEME K-12 teachers members have been nominated for board appointments with the Association of Multicultural Science Education, an Affiliate of the Association of the National Science Teachers Association. Elections will be held at the 2016 NSTA Conference in Nashville, TN.

Jackson Public Schools Superintendent, Dr. Cedric Gray honored the entire CESTEME team of K-12 teachers with the Golden Bow Tie Award of Excellence for the scholarly merit and contributions at the 2015 NSTA Conference.

The Center director, Dr. Paul Tchounwou was awarded the 2013 AAAS Mentor Awrad by the American Association for the Advancement of Science. Only two of such awards are made by AAAS every year. According to AAAS, Dr. Tchounwou was recognized..."for his transformative impact and contributions towards the production of African American doctorates in the field of environmental sciences."

CESTEME director, Dr. Paul Tchounwou is principal investigator and program director of a new $2.98 million grant from the Department of Education through the First in the World Program. This new 4-year grant (2015-19) will enable JSU to implement novel strategies to improve teaching and learning in STEM through a multilevel academic transformation.

The Center director, Dr. Paul Tchounwou received the 2015 One Jackson State University's Faculty Excellence Award for Research and Grantsmanship.

Graduate Students

NAME	PERCENT_SUPPORTED	Discipline
McInnis-Smith, Dominique	0.10	
Brown, Erika	0.03	
Kirui, Philemon	0.05	
Alexander, Turquois	0.05	
Caballero, David	0.05	
Curtis, Rachel	0.05	
Nica, Cristina	0.11	
McDowell, Roderick	0.11	
Negou, Jean	0.05	
Reed, Lamar	0.05	
Evans, Rashad	0.05	
Hypollite, Djouda	0.05	
O'Harroll, Victoria	0.05	
Reese, Towanta	0.11	
Robinson, Lecia	0.05	
Saddler, Karen	0.05	
Sanders, Talia	0.05	
McRaney, Dominique	0.05	
Sanders, Dominick	0.05	
Randolph-Fitch, Casey	0.10	
Allen, Obie	0.05	
Patterson, Carvey	0.05	
Gulledge, Eric M.	0.04	
Johnson, Martha	0.05	
FTE Equivalent:	**1.45**	
Total Number:	**24**	

Names of Post Doctorates

NAME	PERCENT_SUPPORTED
FTE Equivalent:	
Total Number:	

Names of Faculty Supported

NAME	PERCENT_SUPPORTED	National Academy Member
Paul Tchounwou	0.25	
Ahmad, Hafiz	0.10	
Dash, Padmanava	0.10	
Skelton, Gordon	0.10	
Ray, Paresh	0.10	
Arslan, Zikri	0.12	
Leszczynska, Danuta	0.06	
Green, Kantave	0.06	
Das, Himangshu	0.06	
Patlolla, Anita	0.09	
Reddy, Remata	0.06	
Rogers, Christian	0.01	
Sutton, Dwayne	0.12	
Tuluri, Frances	0.05	
Washington, LaShinda	0.01	
Wright, Terrence	0.04	
Milliken, Troy	0.01	
Yedjou, Clement	0.10	
Lin, Li	0.01	
Wang, Feng	0.10	
Kalluru, Rajamohan	0.10	
Graham, Barbara	0.10	
Gentry, Roosevelt	0.19	
Ekunwe, Stephen	0.04	
Kulawardhana, Ranjani	0.11	
Kafoury, Ramzi	0.12	
Whitfield, Joe	0.04	
Kwembe, Tor A.	0.08	
Ayieta, Elijiah	0.20	
Isokpehi, Raphael	0.10	
Walter, Wilbur	0.08	
Martin, Constance	1.00	
Tally, Jana	0.04	
Hill, Glake	0.08	
FTE Equivalent:	**3.83**	
Total Number:	**34**	

Names of Under Graduate students supported

NAME	PERCENT_SUPPORTED	Discipline
Fountain, Myeisha	1.00	
Agusiegbe, Chuiks	0.06	
Barber, Jordan	1.00	
Cowan, Terriona	1.00	
Garrett, Shontrice	1.00	
Griffin, Justin	1.00	
Hailey, Brittany	1.00	
Martin, Luther	1.00	
Miller, Trenton	1.00	
Newell, Porsha	0.06	
Parker, Trey	0.06	
Sheard, Deuntae	0.06	
Hemmingway, Tometrick	1.00	
Nelson, Imani	1.00	
Stewart, Devin	1.00	
King, Bria	0.05	
Victorian, Jheena	1.00	
Boyd, Gacobie	0.05	
Finch, Romero	0.05	
Travillion, Jordan	0.05	
Williams, Kiara	0.05	
Johnson, Isis	0.05	
Hawkins, Jameria	0.02	
Johnson, Travis	0.05	
Rogers, Alexis	0.06	
Thompson, Michael	0.05	
Gills, Kelli	1.00	
White, Jeremy	1.00	
Robinson, Kamron	1.00	
FTE Equivalent:	**15.72**	
Total Number:	**29**	

Student Metrics

This section only applies to graduating undergraduates supported by this agreement in this reporting period

The number of undergraduates funded by this agreement who graduated during this period: 13.00

The number of undergraduates funded by this agreement who graduated during this period with a degree in science, mathematics, engineering, or technology fields:..... 13.00

The number of undergraduates funded by your agreement who graduated during this period and will continue to pursue a graduate or Ph.D. degree in science, mathematics, engineering, or technology fields:..... 8.00

Number of graduating undergraduates who achieved a 3.5 GPA to 4.0 (4.0 max scale):..... 5.00

Number of graduating undergraduates funded by a DoD funded Center of Excellence grant for Education, Research and Engineering:..... 13.00

The number of undergraduates funded by your agreement who graduated during this period and intend to work for the Department of Defense 12.00

The number of undergraduates funded by your agreement who graduated during this period and will receive scholarships or fellowships for further studies in science, mathematics, engineering or technology fields:..... 9.00

Names of Personnel receiving masters degrees

NAME
Total Number:

Names of personnel receiving PHDs

NAME
Total Number:

Names of other research staff

NAME	PERCENT_SUPPORTED
Cheeks-Butler, Ebonie	0.06
Cox, Tammy	0.06
McKinney, Tanjaniekia	0.06
Kelly, Desma	0.05
Washington, Dave	0.06
Davis, Betty	0.05
Randolph, Jonathan	0.05
FTE Equivalent:	**0.39**
Total Number:	**7**

Sub Contractors (DD882)

Inventions (DD882)

Scientific Progress

Technology Transfer

Jackson State University provided professional development activities to Jackson Public School District teachers and Hinds Community Colleges faculty to enhance their scientific, technological and pedagogical skills. We have also engaged them in research activities conducted by the Center's faculty, and well as involving them in conferences and seminars series co-sponsored by the Center.

The Center director, Dr. Paul Tchounwou has interacted with DoD scientists and engineers at Army's Engineering Research and Development Center (ERDC) at Vicksburg, Mississippi, to seek help in support of the implementation of Center's activities. They have contributed to our distinguished seminars and workshops series and conferences, and have shared their scientific knowledge and expertise with the faculty , and well as with the DoD scholar and DoD fellow.

Introduction

The Center of Excellence in Science, Engineering, Technology and Mathematics Education *(CESTEME)* has continued to leverage its resources to address the critical issue of underrepresentation of minority students in STEM fields, and their low levels of degree attainment in STEM disciplines due to impeding factors such as lack of strong academic preparation, increased tuition fees, lack of family role models, and inadequate student support services. Hence, through the CESTEME Jackson State University has continued to partner with Jackson Public School District (JPSD), and Hinds Community College (HCC) to address the critical needs of preparing the next generation of scientists, technologists, engineers, and mathematicians in important areas of relevance to the DoD mission.

During the grant reporting period (July 01, 2011 – September 30, 2015), the Center of Excellence implemented important program activities towards achieving its overarching goal of developing a STEM pipeline to provide meaningful solutions to the major challenges, and especially the projected shortfall of scientists, technologists, engineers and mathematicians among the diverse populations of the 21st century. Through collaboration with JPSD and HCC program activities were designed to meet its goal of building a rigorous STEM program that will:

1. Enhance the academic infrastructure of STEM related programs at their respective institutions, and

2. Recruit, train, and mentor academically talented K-12 and undergraduate students to pursue careers and advanced degrees in STEM disciplines of relevance to the mission of the Department of Defense (DoD).

A. Specific Aims and Strategic Activities

Activities implemented during the funding period to achieve the CESTEME's specific aims are as follows:

1. ***Enhance existing STEM infrastructure…by expanding and equipping the current student support centers at JSU, HCC, and JPSD; redesigning existing classrooms to enrich instructional and research activities, and hiring coordinators for STEM student services.***

Jackson State University - The Center of Excellence has served a catalyst to develop STEM infrastructure and has played a vital part of connecting with the undergraduate DoD Scholars, and the K-12 DoD Fellows. The Program manager conducted monthly meetings with the DoD Scholars to keep them abreast of current STEM activities within the College of Science, Technology and Engineering, and other matters as it relates to their success in their major program of study. The Center of Excellence has been used

as a quiet area where students can prepare for weekly quizzes and final exams. Equipped with - Dell computers, 1- HP Color Multi-Function Printer, 1- HP Laser Printer, bookshelves, 1- storage cabinet, 2-file cabinets, 1-Fax machine, 18-office chairs, 1-projection screen, a portable projector, white board and internet accessible, the Resource Center has continued to provide an ideal environment for tutoring and conducting meetings with the 16 DoD scholars at JSU. Also, test preparation books are made available for use by DoD Scholars as they begin to prepare for the GRE, Praxis Examination, and ACT test prep for the K-12 DoD Fellows. In addition to the availability of print materials and books, the students used the computers for internet searches, word processing, homework assignments, and for preparing posters and power point presentations for conferences and workshops. The CESTEME website (http//:www.jsums.edu/centerexcellencescience) that has been developed served as a platform to provide updated information on the Center's vision, mission, specific aims, and strategic activities. In year 4- twenty-one laptop computers were ordered and made available for the DoD Scholars. Additionally, 31 Dell Precision desktop computers were added to the Center of Excellence to continue to provide support for the remaining DoD Scholars, the K12 DoD fellows and the HCC transfer students who are currently attending JSU (fall 2015). In addition, space was renovated to provide an adequate environment to support faculty research and research training of students in STEM fields. DoD funding also provided funding for the purchase of laboratory equipment and supplies to support both academic year and summer research activities of DoD fellows, DoD scholars, and participating faculty.

Several scientific instruments were also purchased for research and student training at Jackson State University. These equipment included two 18.2 Cu FT refrigerator/freezers, one benchtop centrifuge, one Thermo Scientific Herasafe KS18 biological safety cabinet, one pH meter, one Thermo Scientific Orion Star microcentrifuge, one Sorvall Legend Micro 21R refrigerated incubator, one Thermo Scientific Forma incubator; one EVOS digital inverted fluorescence microscope, one fraction collection system, one vacuum aspirator, one Bel-Art inverted microscope, one Fisher Scientific Infinity phase contrast microscope, one ROSS Ultra platform shaker system, one Compact Digital UV/Vis spectrophotometer, and one Thermo Scientific Finn pipette.

Hinds Community College- Improvements to the STEM infrastructure during the grant period included the installation of the 3-D projection system (NavTech, LLC in Enterprise, AL). The system is fully operational and programs for scientific visualization were loaded into the system. The CESTEME computer lab that was established during year one has been and continues to be used by STEM students multiple times a week. Computer software was purchased which enhanced chemistry, physics, computer programming, and mathematics courses. During Year 4, the Computer lab was completely renovated and it is a much larger space, and equipped with 23 desktop computers, a LCD projector, and a laser printer. Equipment purchases were also made to enhance teaching in the Chemistry and Organic Chemistry laboratory classes at HCC. Purchases included 4-MelTemp melting point apparatus, 400-various clamps for

labs, 24 Brisk heating mantles and rheostats, 1 Eagle acid cabinet, 4 Ohaus analytical balances, 10 Fisher Scientific hot plates, 10 VWR vortexes, 80 ring stands, 15 ChemDraw 3D drawing software, 1 Fisher Brand water bath, and 1 Brinkman block heater.

Jackson Public School District – Purchase of several key pieces of equipment was done to provide opportunities to biology and chemistry teachers to use novel technologies to enhance teaching and learning. Equipment purchases included 6-Ken-A-vision microscopes, and supplies such as Cell zone molecular puzzles, and mitosis sequencing kits. Also, Vernier Software technologies with 35 Lab Quest 2 devices and probes and Logger Pro 3 Software were purchased to conduct hands on lab experiments. These experiments include activities for measuring of pressure, temperature, oxygen and carbon dioxide; and observing time and global positioning data in these experiments. The JPSD CESTEME teachers attended a hands-on training workshop hosted by Vernier Software and Technology Company. The training sessions discussed how to effectively use the LabQuest2 data collection devices and probes for scientific research. This equipment can be used to teach chemistry, biology, or physics experiments; offering an exciting hands-on teaching and learning experience for all JPS students. Additionally, 100 TS-84 Plus Silver Edition Calculators were purchased and distributed to the five high schools. During Year 3 (2013-2014) 44 additional Ken-A-Vision (T-19018C) Microscopes were purchased and sent to the five High Schools. Each school now has ten microscopes which allow students to have access to quality laboratory equipment. Cell structure slides and learning kits were also purchased to utilize the microscopes. After lab classes, students pair into groups and use flash cards to distinguish the differences in each cell structure and composition. Also, additional classroom and lab equipment, including calculators, glassware, personal protective wear and curriculum aids were purchased. Additional equipment is slated to be purchased in the coming year. During year 4 additional instructional aide materials and laboratory equipment were purchased. For Laboratory Science classes, chemicals, beakers and flask glassware, personal protection equipment, dissection specimens, electrophoresis equipment and various other items were purchased to enhance instruction in this subject. In addition to the above referenced materials, high resolution digital and stereoscopic microscopes were purchased for schools with forensic science programs.

For Physical Science classes, items such as magnetizers, electrostatics kits, density identification kits, stethoscopes, Newtonian demonstrators, muscular systems charts, Systems of the Human Body series, Classifying Living Things laboratory kits, Taxonomic key kits and various other items were purchased to enhance instruction in Physical Science. For Life Science classes, items such as class sets of dissection instruments, magnetic mitosis demonstration kits, ABO/Rh simulated blood typing laboratory kits, DNA fingerprinting kits, transparent man/woman models and gingerbread anatomy laboratory kits were among learning tools purchased to enhance instruction in this subject. For State Testing Preparation, class sets of the Mississippi Subject Area Testing Program (SATP) review guides for Biology were purchased.

These books are designed in compliance with the MS State Department of Education to help students review skills needed to pass the Biology end-of-course test in Mississippi.

The teachers utilized purchased equipment and best practices learned from professional development conferences and workshops to enhance their curriculum offerings to all students. Forensic Science has become a popular course for students in the Jackson Public School District. High definition microscopes and other laboratory kits were purchased to enhance the teaching and learning experience in this subject. This level of science makes our students more academically competitive in the science community and ultimately throughout their college careers.

The STEM teachers who attended national conferences, returned to their respective buildings with a wealth of knowledge on how to simplify their teaching style and add creative ways to engage students. During the 2015 year, the JPS teachers attended a session with Master Scientist, Grand Hank. He demonstrated fun ways to incorporate music and games to science class. These activities take little time to no extra cost to adapt in any classroom. They learned a rap on determining acids and bases.

Outcomes: The specific aim to enhance existing STEM infrastructure was fully achieved at Jackson State University, Hinds Community College and Jackson Public School District. A comprehensive overview of infrastructure development activities and outcomes is presented in **Table 1**. Prior to the DoD grant funding there was a critical need for partner institutions to have the funds necessary to strengthen the research and learning environment in STEM. The funds provided each institution the opportunity to renovate the teaching and research space, as well as to purchase needed supplies and equipment for STEM research and education. With the ability to have the needed equipment and classroom supplies in Biology, Chemistry and Physics courses DoD fellows were able to actively participate in their classes, and JPSD teachers and DoD scholars were able to actively engage in discovery-based research. The students were academically prepared to major in STEM courses of study and have the knowledge/skills necessary to develop their STEM careers and become competitive in their transition throughout the STEM pipeline. The JPSD teachers utilized purchased equipment and best practices learned from professional development conferences and workshops to enhance their curriculum offerings to students. Also, the STEM teachers who attended national conferences, returned to their respective buildings with a wealth of knowledge on how to simplify their teaching style and add creative ways to engage students. Hinds Community College established a new computer laboratory equipped with 23 computers, projector and a laser printer. A large table and white board were purchased to facilitate tutoring. This lab highly enhanced STEM learning by providing a space for students to study and have the latest technological equipment available to them.

2. *Provide support for K-12 and Undergraduate STEM students…by providing a mandatory summer orientation program, advisement, peer mentoring, group study, workshop and Computer-based learning*.

To address this aim Jackson State University's CESTEME Principal Investigator and Program Manager met with JPSD district administrators, principals, JPSD teachers and JSU faculty to plan and implement the Saturday Academy program for the 25 DoD Fellows beginning in September 2011. Hence, during each academic year (From September to May) of the grant period, the twenty-five DoD Fellows were engaged in important enrichment activities in the areas of Chemistry, Mathematics, Physics, and Biology. During the spring 2014 Saturday Academy we added an Engineering enrichment session as well as a Computer Science enrichment session. Every year of the grant period, the closing of the Saturday Academy program was held in November for the fall semester and in April for the spring semester. During the closing sessions, DoD Fellows made power point presentations on the materials covered during the Saturday Academy. Their high school STEM teachers, school administrators, parents, and JSU Faculty attended the programs**.**

Hinds Community College (Summer Enrichment)- During each of the four-year grant period HCC offered summer enrichment classes for STEM students. This enrichment program included courses to increase the freshmen students' knowledge of chemistry, physics, computer programming, and pre-calculus. These courses were previously selected because the students were scheduled to take them during their sophomore year. The program offered by the HCC Program Coordinator (Jason Webb) and a faculty mentor (Johannah Williams), was designed to increase the students' knowledge of chemistry, physics, computer programming, and pre-calculus. A few students took the courses to improve their knowledge before transferring to Jackson State University. Mentors were assigned to the STEM students to work with them in their areas of study making sure they remained on track to complete their programs of study and ready to transfer to JSU.

Outcome: This objective was effectively achieved at all partner institutions. The STEM enrichment sessions strengthened the students' knowledge in any subject they were experiencing difficulties. The DoD Scholars had regular meetings with advisors to monitor their academic progress. Additionally, the students formed peer-to-peer tutoring/mentoring groups which further served to strengthen their ability to be successful in their academic courses. The addition of supplemental computer software in Mathematics, Physics, and Chemistry gave the students the opportunities to address weaknesses in a particular subject. The computer laboratory and resource centers identified a place for students to use for study and to complete assignments. The faculty mentors helped to keep students on track in terms of meeting University, major and program requirements. **Table 2** presents an overview of selected support mechanisms at partnering institutions.

The initial Saturday Academy Enrichment Program opened in January 2012 (8-sessions) and continued through the spring 2015. The K-12 DoD Fellows consistently attended and participated in Biology, Chemistry, Mathematics and Physics enrichment sessions. The students expressed an interest in enhancing their knowledge in engineering and computer science as a result these sessions were added to the Saturday Enrichment Program. The DoD Fellows who participated in the ACT workshops benefitted substantially, and showed an increase in their initial ACT scores by at least 1.44% [**Table 3**].

3. *Develop and implement a student enrichment program…*by providing opportunities for students to participate in tutoring sessions, organized seminars, workshops and conferences in specific multidisciplinary areas of STEM education. This aim has been addressed as indicated below:

Tutoring

Jackson State University

The DoD Scholars were challenged academically because each year STEM courses become more rigorous and challenging. Therefore tutoring was essential to their success in these courses. The scholars participated in tutoring sessions in Calculus and Differential Equation, Physics, and Organic Chemistry. Additionally, the scholars formed peer tutoring groups as a collaborative effort to share and gain knowledge/experiences from each other. In spite of the academic challenges the JSU DoD Scholars were successful in their efforts to maintain their grade point averages. Also, through the recently established Scholar's Academy, the College of Science, Engineering and Technology has also continued to offer tutorial services/sessions across the campus in all major STEM courses.

The JSU DoD Scholars also assisted with Saturday Academy enrichment sessions by interacting with the DoD Fellows (K-12 students). The DoD Scholars provided hands-on help in Biology, Mathematics, Physics, and Chemistry. They also shared their college experiences with the K-12 DoD Fellows.

Hinds Community College

In addition to the summer program, HCC students participated in weekly tutoring in chemistry, physics, computer science, and mathematics during the fall and spring semesters. The weekly tutoring sessions gave students a chance to be more successful in the above-referenced courses. However, if there was a need in another discipline, i.e. English, History, etc., every effort was made to ensure the overall success of the students.

Organized schedules allowed HCC DoD Scholars to meet on the last Tuesday of every month with mentors to discuss any academic issues that they may have. This time was

used to make sure students were being successful in their courses and to plan any interventions that might be necessary. Assignments were made for students to work on and to have them completed by the next meeting time.

Freshmen students were asked to research their chosen major and learn what type of career options and salaries that STEM fields offer. They were also asked to map out their education by semester starting at Hinds Community College until graduation from Jackson State University. This was a very good exercise for the STEM students because they started thinking about the "big picture" in terms of education, career development and possibilities of graduate school. They also received help with their class schedules for the following semesters based on the above conversations. Year 2 students were tasked with tutoring and mentoring Year One STEM students. They were also given the opportunity to work with someone in their chosen discipline to learn more about their major and job prospects.

During the summer 5-7 students participated in the Summer Enrichment Program. The program included courses to increase the students' knowledge of Chemistry, physics, computer programming, and pre-calculus. The students needed the courses to prepare them for their sophomore year STEM courses. In addition to the Summer Enrichment Program, weekly tutoring was offered in Chemistry, physics, Mathematics for HCC-STEM students and to help them achieve success in the fall semester. Mentors were assigned to the STEM students during the fall 2015. The mentors worked with the students in their areas of study to make sure they stayed on track to finish at Hinds and are ready to transfer to JSU. During the final months of the CESTEME program, HCC Coordinator, Mr. Webb, used the remaining funds to support the five returning DoD Scholars. Each student recognized that he/she would only be funded for one semester during the period of no-cost grant extension.

Jackson Public School District

At JPSD, each of the STEM teachers conducted after school tutorial sessions to focus on areas of need. The tutorial sessions were not just for DoD fellows but for all STEM students. All students who needed help were invited to enroll and participate in these tutorials.

Outcome: This specific aim was fully met at each institution (JSU, HCC, and JPSD). All institutions realized the importance of strengthening the students' knowledge in STEM. They realized that as students transitioned through STEM courses, their subjects would become more rigorous and in order to be successful they were going to need tutoring. Each institution addressed this need by providing tutoring in gatekeeper courses. The coordinators worked diligently to ensure that tutorial services were available to the DoD Scholars. Coordinators met regularly with the Scholars to address their deficits. The College of Science at JSU established the Scholars Academy which offered tutoring in all STEM courses across the campus and the scholars were provided with the schedule and encouraged to seek immediate help if needed. The DoD scholars were required to

submit their grades at mid-term to address any deficits and tutorial needs and if the mid-term grade was not a B or better, the students were required to attend tutoring. The DoD Scholars at HCC met weekly to make sure students were successful in their courses. Jackson Public School District STEM teachers conducted afterschool tutorials with any student who needed help in their subjects.

Conferences/Workshops/Seminars

- DoD Scholars attended the 9th International Symposium on Recent Advances in Environmental Health Research at the Jackson Marriott Hotel from September 17-20, 2012. Five of them also presented posters for the poster session. They were also provided the opportunity to meet with experts in the fields of environmental research and public health.

- In February 2013 the DoD scholars participated in the Louis Stokes Mississippi Alliance for Minority Participation National Research Conference. One of these scholars, Justin Griffin placed 2nd in the oral presentation and the other students participated in the poster presentation.

- DoD Scholar, Shontrice Garrett (Mathematics major), attended the 64th National Conference for Undergraduate Women in Mathematics in Lincoln, Nebraska along with her research mentor, Dr. Jana Talley. Shontrice presented her research project entitled "Mobile Devices in the Classroom: Promoting Mathematical Discourse." This study is designed to examine how the use of mobile devices in lower level college courses affect how students interact with the teacher on the lesson being taught. Shontrice also attended Leading the Way: Research Forum which was hosted by the W.E. B. DuBois Honors College and Research Scholars Day hosted by the Department of History and Geography. In both conferences she shared the research she is conducting as a result of her participation in CESTEME.

In 2013, DoD Scholars also attended four seminars series held on the campus of Jackson State University as indicated below:

- "In Silico Comparison of Natural and Nitramine Binding to 3-D Models of the Gamma Amino Butyric Acid A-type Receptor for Excitotoxicity Screening". Presenter: Dr. Jason Ford-Green, Research Assistant Professor, University of Mississippi. October 05, 2012.

- "The Peer-Led Team Learning (PLTL) Model". Presenters: Dr. A.E, Dreyfuss, Professor, New York City College of Technology, CUNY, NY; Drs. Mitsue Nakamura and Ongard Sirisaengtaksin, Professors, University of Houston-Downtown, TX, January 25, 2013.

- "Overview and Best Practices of Biotechnology Education and Research at the University of Houston" Presenter: Dr. Rupa Lyer, Associate Professor, Director,

Biotechnology Programs, and Director, Center for Life Sciences Technology, College of Technology, University of Houston. February 26, 2013.

- "The Elastin-like Polypeptide Drug Delivery System". Presenter: Dr. Gene Bidwell, Professor at the University of Mississippi Medical Center. Co-sponsored by the NSF-CREST-Center for Interdisciplinary Nanotoxicity Studies. February 22, 2013.

- DoD Scholars, DoD Fellows and the JPSD teachers attended the 10th International Symposium on Recent Advances in Environmental Health Research at the Jackson Convention Center from September 15-18, 2013. Eighteen CESTEME program participants participated in the poster contest. Tometrick Hemmingway placed 1st in the undergraduate division. DoD Scholars, DoD Fellows and JPSD teachers were also provided the opportunity to meet with experts in the fields of environmental research and public health.

- Luther Martin attended the University of Michigan Graduate Symposium in Ann Arbor, MI., from November 14-16, 2013.

- In February 2014 the DoD scholars and DoD Fellows (k-12) participated in the College of Science, Engineering and Technology Research Symposium. Deborah Luckett, DoD Fellow (K-12) placed first in the High School division.

- DoD Scholar, Brittany Hailey attended the American Meteorological Society's Annual Meeting in Atlanta, GA February 2-6, 2014

- DoD Scholars, Luther Martin and Jordan Barber attended the Black Engineer of the Year Award in Washington, D.C., February 6-9, 2014

- Luther Martin also attended the National Society of Black Engineers National Convention in Nashville, TN. March 26-30, 2014.

- DoD Scholar, Shontrice Garrett (Mathematics major) was invited to present her research project at the MATHFEST 2014 hosted by the Mathematical Association of America in Portland, Oregon, August 6-8, 2014. As a result of Shontrice's accomplishments at JSU, she was invited to speak about being a young African-American woman in STEM. This event was sponsored by the Southern District Conference, Illinois Association of Colored Women and Youth Affiliates in Alton, IL.

- Jeremy White (DoD Scholar) participated in the poster contest at the Richard H. Sullivan Science Conference "Immobilization of Salen on Chromosorb 106 Polymer and Application of Solid Phase Extraction of Trace Elements for ICP-MS Detection." Jeremy is also working with his research mentor, Dr. Zikri Arslan to publish his research entitled "Immobilization of Salen on Chromosorb 106 Polymer and Application of Solid Phase Extraction of Trace Elements for ICP-MS Detection" .

JSU DoD Scholars, K-12 DoD Fellows and the JPSD teachers attended the 12th International Symposium on Recent Advances in Environmental Health Research at the Marriott Hotel September 13-16, 2015.

The CESTEME Jackson Public School teachers presented for a third consecutive time at the National Science Teachers (NSTA) Conference. These presentations are conducted under the affiliate organization, the Association for Multicultural Science Education (AMSE). Each year our team discussed problems and solutions in K-12 science education and the Next Generation Science Standards (NGSS) to a broad audience of seasoned teachers, administrators and educational review board members.

DoD Scholar, Shontrice Garrett along with mentor, Dr. Jana Talley attended and presented at the Joint Mathematics Conference (January 10-13, 2015) in San Antonio, TX.

Jeremy White and Terriona Cowan and mentor, Dr. Zikri Arslan attended and participated in the MS Academy of Sciences Conference in Hattiesburg, MS. February 26-27, 2015.

The K12 DoD Fellows attended several sessions at the Computer Science Real Talk Symposium on March 20-21, 2015. This symposium provided an opportunity to the students to interact with successful JSU alumni who are currently employed within their major field of study. The workshop sessions included interviewing skills 101, marketing your skills, talents and abilities to meet an employer needs, managing your finances during and after college, protecting your digital footprint, Time management, Critical thinking: Learn how to think outside the Box, a Chat and Chew (the students got an opportunity to talk one on one with the presenters).

Mississippi Science and Engineering Fair

During the grant period, the CESTEME Program at JSU prepared and organized the K12 students to participate in the Mississippi Regional Science and Engineering Fair, starting with their first participation in March 2013. As a result Carah Young (DoD Fellow) from Wingfield High School placed 2nd in the category of Behavior and Social Science, her research topic was “Do You See What I See?”

In March 2014 six K-12 DoD Fellows including Kelsey Figure, Carah Young, and LaShayla Yates (Wingfield high school) and Pablo Williams, Victoria Williams, Sara Bibbs, DeBorah Luckett (Jim Hill high school) participated in the MS Regional Science Fair in Jackson, MS. Three of them including Pablo Williams (Jim Hill high school), Victoria Williams (Jim Hill High School) and LaShayla Yates (Wingfield high school) advanced to the State Science Fair in Greenville, MS.

In March 2015 three DoD Fellows were Upper Fair winners (1st Place Deborah Luckett, and Jaylen Davis, 3rd place and 5th place LaShayla Yates), and two other DoD Fellows

were placed in the Special Award category (American Chemistry Society Local Section Award- LaShayla Yates; and U.S. Department of Health and Human Services Award - DeBorah Luckett).

Outcome: Each year the JSU DoD Scholars and JPSD teachers presented their research projects at the International Symposium on Recent Advances in Environmental Health Research and the Louis Stokes Alliance for Minority Participation National Research Conference. In addition to these local conferences in 2012 Shontrice Garrett and her mentor, Dr. Jana Talley attended and presented research at the 64th National Conference for Undergraduate Women in Mathematics in Lincoln, Nebraska. They also presented at the MATHFEST 2014 in Portland. Jeremy White and Terriona Cowan, with their mentor, Dr. Zikri Arslan participated in the yearly conference of MS Academy of Science. Brittany Hailey also attended the American Meteorological Society's Annual Meeting in Atlanta, GA. These scholars developed critical thinking/problem solving and application of relevant data in research and how to prepare and present scientific research [Table 4].

Research Internships

Eight of the fifteen DoD Scholars (undergraduate students) participated in summer research internships at other institutions of higher learning, national labs, and/or industry. These included:

- Chuks Agusiegbe (Biology major), Meharry Medical College, Nashville, TN.
- Terriona Cowan (Chemistry major), Argonne Laboratory, Chicago, IL.
- Brittany Hailey (Meteorology major), Scripps Research Institute of Oceanography, University of California, San Diego.
- Myiesha Fountain-(Biology), University of Arkansas Medical Sciences
- Luther Martin (Computer Engineering major), Boeing Company, St. Louis, MO. University of Washington, Seattle, WA; and University of Michigan, Ann Arbor, MI
- Imani Nelson (Biology major), Meharry Medical College in Nashville, TN.
- Alexis Rogers (Chemistry major), Eli Lilly Pharmaceutical Company, Indianapolis, IN.
- Devin Stewart (Biology major), Texas A & M University, Dallas, TX., and Harvard University, Boston, MA

The remaining JSU DoD scholars and JPSD teachers fully participated in the Summer Research Institute at JSU. At Hinds Community College DoD Scholars were also given the opportunity to work with professionals in their chosen disciplines to learn about their major and job prospects. To further expose the students to STEM professions, DoD scholars were taken out for an experiential visit of an Environmental/Analytical laboratory in Madison, MS, during the spring semester.

Outcome: As a result of the DoD Scholars' desire to expand their knowledge and opportunities in STEM they participated in summer internships at other institutions of higher learning such as Meharry Medical College, University of Washington, Seattle,

University of Mitchell, Ann Arbor, University of Arkansas, Texas A & M and Harvard University. Others took internships at Argonne National Laboratory and Eli Lilly Pharmaceutical Company. The Scholars who did not take summer internships participated in the 6-week Summer Research Institute at Jackson State University. The DoD Scholars' participation in these programs enhanced their experiences in the classroom, and helped them to secure admission to graduate school and jobs in their fields of study.

4. ***Enhance existing STEM programs*…by assessing and revising course offerings in light of the new trends in global education, and redesigning/updating STEM curricula to address the core competencies of STEM students at JSU, HCC, and JPSD.**

To address this specific aim, Jackson State University, College of Science, Engineering, and Technology has implemented the new 4-three credit hour mathematics-calculus course sequence (MATH 241, MATH 242, MATH 243 and MATH 244) that has been developed from the redesigning of the former 3-four credit hour Calculus sequence (MATH 231, MATH- 232 and MATH 233) to streamline the transition process to ensure that students transferring from HCC have a smooth transition to JSU. Also, another 2 plus 2 program of study in Biology was already in place. In fall 2015, we also reviewed the syllabi and content of the physics courses at HCC and JSU, and discussions are currently being made to streamline the process to insure a smooth transition of HCC' students to STEM majors at JSU.

Outcome: As mentioned above, this specific aim addressed the difficulties students often faced when transitioning from a junior/community college to a major university. Due to the redesigning of courses and the 2+2 agreements students from HCC can now transition without the worry of having to take extra courses to make up for deficits in their STEM programs of study. To further assist community college students entering Jackson State University, the University has established the Center for Community College Relations as a portal of entry for community college students to assist them in their transition to JSU.

5. ***Recruit, train and mentor K-12 (high school) and undergraduate students in specific multidisciplinary areas of environmental science/GIS and remote sensing; atmospheric sciences/climate change; environmental health and environmental restoration; nanoscience, nanotechnology and nanotoxicology; computer engineering and information science; and bioinformatics and computational biology…*** by implementing: a) Saturday Academy Program that enhances science and math skills of K-12 students enable them to carry out competitive research projects for presentation at Science and Engineering Fairs; b) Academic-Year Enrichment Program that provides opportunities to JSU and HCC undergraduate students to engage in multidisciplinary research; and c) Summer Research Institute (including a Laboratory Rotation) that provides opportunities for K-12 teachers, and

undergraduate students to engage in specific multidisciplinary research projects at JSU, national laboratories, or other institutions of higher learning.

Recruitment

Jackson State University (JSU)

In 2011 JSU selected sixteen DoD Scholars from STEM majors to participate in the Center of Excellence in STEM Education Program. The students were selected by the department chairs and recommended for placement in the program. To date the program has mentored and provided research opportunities for the JSU DoD Scholars **Table 4** presents the list of JSU DoD scholars and their graduation status.

Hinds Community College (HCC)

At HCC, efforts were made every year to recruit freshman students to participate in the CESTEME program. During the grant period a total of twenty students have been targeted, eighteen of whom have participated in the program as DoD Fellows. Of these eighteen, 13 have transitioned into BS degree programs in STEM, and five are in their sophomore year at Hinds. **Table 5** presents the list of HCC DoD Scholars and their current status.

Jackson Public School District (JPSD)

JPSD recruited a cohort of 25 DoD Fellows (9^{th} graders) during year 1 to participate in the CESTEME program. The students were selected from the five CESTEME high schools: Bailey Magnet, Jim Hill, Lanier, Provine, and Wingfield. The main criterion for selection to participate in the program was based upon their academic performance in science and mathematics during middle school. Also, the parents had to consent for their child to participate in the program**.** This year (2014-2015) the program maintained the twenty five students (five students from each of the five STEM High schools). The attendance and commitment to the program is highly commendable. The entire cohort of K-12 DoD Fellows graduated in June 2015. They have all planned to pursue rigorous STEM degree programs at universities **[Table 6].**

Saturday Academy

As stated above twenty five DoD Fellows (K-12 students) were selected, and all were engaged in the Saturday Academy Enrichment Program. During the grant period a total of 43 academy sessions were organized for an average of 10-11 sessions per academic year. During the Saturday Academy enrichment sessions the students were engaged in solving math problems which included Trigonometry, Calculus, fundamental drills and ACT Prep math strategies. In Biology, the enrichment sessions included: The Human Anatomy and Physiology and how important each system is individually and as an integrated set of systems. Models were used to aid the students in being able to

conceptualize the materials being presented. The students received instruction on how to develop a research plan, and a session on how to study science. Additionally, since all of the DoD Fellows were expected to graduate in May 2015, the DoD fellows talked about the colleges/universities they planned to attend and their intended majors. During the spring semester, an entire Saturday session was devoted to helping the students prepare their science fair projects, the judging process (answering the judges questions, and organizing their display boards). The faculty members utilized open forum discussions to allow the students to ask questions and to make sure they understood the materials. Other Biology sessions included careers in Science and wet laboratory experiments such as the Onion Cell, Acids, Bases, and pH Scale and Cheek Cell. The experiments were designed to provide hands-on experiences and scientific skills that force the DoD Fellows to ask questions about science concepts and to think critically.

The Chemistry professor conducted a host of chemistry laboratory experiments in which students were to observe chemical changes and reactions. In Physics, the students discussed Boyle's Law and the Ideal Gas Law and how to solve an ideal gas law equation coupled with various physics demonstrations. The Engineering professor conducted sessions on optimization theory and transportation engineering, unconfined compression test and an informational session on careers in engineering.

The last Saturday Academy closing program was held on Saturday, March 28, 2015. The students made excellent power point presentations which displayed what they learned in the Saturday sessions. High school teachers, JPSD administrators, JSU faculty and parents attended the closing ceremonies. Also, attendance awards were given to the DoD Fellows who had perfect attendance, and they received their stipends**.** Awards were also presented to the students who participated in the Science Fair as well as the faculty in appreciation for their dedication to the Saturday Academy Program.

Outcome: The Saturday Academy Enrichment Program (K-12 DoD Fellows) provided the opportunity for the 25 DoD Fellows to receive enrichments in Biology, Chemistry, Physics, Mathematics, Engineering and ACT Preparation instruction. The faculty utilized open forum discussions which allowed the opportunity for students to be fully engaged in the sessions. In addition to open forum sessions, the students were engaged in hands-on laboratory experiments in Biology, Chemistry and Physics. In mathematics the professor engaged the students in Algebra, Trigonometry, Calculus and quick strategies for solving problems on the ACT. In addition to the STEM enrichment in the aforementioned area, the faculty members conducted an exploratory session on STEM majors and careers. This session helped the students to really think about majors and careers. Currently, 16 of the DoD Fellows chose to pursue their undergraduate degree in a STEM related major. The initial Saturday Academy Enrichment session began spring 2012 and continued every academic year through April 2015. K-12 DoD Fellows attended a total of 43 sessions (approximately 13-15 per school year) **[Table 7]**. **Table 8** shows a sample of Saturday Academy Program for fall 2014 and spring 2015.

Field Trips

During the 2015 Summer Bridge Program the incoming freshman visited the USDA Agriculture Research Education Facility in Stoneville, MS. The students took guided tours to several of the research laboratories at the facility which included Genomics and Bioinformatics Research Unity, Warm water Aquaculture Research Unit, Southern Insects Management Research Unit, and the National Biological Control of Pest Research Unit. The SBP participants also toured the following campus sites the Fannie Lou Hammer Institute at the COFO (Council of Federated Organizations), and the MS NAACP and the historic Ayers Hall.

At Hinds Community College, DoD Scholars took a tour of the John C. Stennis Space Center in February 2015. The reason for this tour was to allow students the opportunity to see the infrastructure and to gain knowledge of the space technology.

Summer Research Institute (SRI) for K-12 Teachers and Undergraduate Students
This six-week research program was organized during the months of June and July of every grant year. Prior to the beginning of the SRI several planning meetings were held with the faculty, JPSD teachers and mentors to develop strategies to implement the most effective program to meet the goals and objectives of the grant. An official opening program was held in June at the beginning of every session during which each DoD Scholar or Jackson Public School teacher is provided with a copy of the weekly schedule itemizing the specific activities to be executed during the six weeks**.**

Program participants included the 5 JPSD STEM teachers and JSU undergraduate students (DoD Scholars). **Table 9** shows the list of DOD scholars and their mentors, and **Table 10** shows the list of specific research projects that they worked on during the grant period. The workshop sessions were held as outlined in the grant proposal. Scheduled activities were built upon the foundations developed in previous summer sessions to enhance participants' understanding of scientific inquiry and research methodology, principles of laboratory operation and safety standards, good practices in the laboratory, research proposal development, research design, data collection, analysis and presentation, and scientific writing.

A description of a typical schedule is as follows:

- During Week 1, educational sessions included topics on research design, introduction to mathematical research, introduction to nanoscience and technology, statistical analysis, literature review, GIS and remote sensing: theory and application, introduction to visual analytics, simulation and modeling, lab safety: Good Practices in the Laboratory, Introduction to Atmospheric Science and Climate Change.

- During Week 2 the DoD Scholars and JPSD teachers completed rotations in core laboratories including: Analytical, Computational Chemistry, Molecular and Cellular Biology, Biostatistics, Electron Microscopy, Environmental Engineering, Material Science, GIS and Remote Sensing, Meteorology and Bioinformatics and Computational

Biology, Mathematical and Computer-Assisted Learning and Teaching, Biostatistical Support Unit, Cellomics and Toxicogenomics core laboratories. The lab rotations provided a basic technical foundation for teachers and scholars. It acquainted teachers and scholars with important areas of STEM research and introduced them to a variety of research methods, protocols, procedures, and approaches. The teachers and scholars selected a specific area of research and a faculty researcher was assigned to guide the research project.

- During the last 4 weeks (Weeks 3-6) the DoD Scholars and JPSD teachers were assigned to their research mentors to continue work on specific research projects. The JPSD (K-12) teachers selected mentors based upon their specific research interest and teaching responsibilities at their respective schools.

- At closing of the 6-week program, the teachers and scholars presented their research, and annually they also presented their research at a national research symposium and at local seminars and conferences. Three of the faculty research mentors plan to submit their research findings in a peer reviewed journal. The closing program was held in July at the end of every summer session and the JPSD teachers and DoD scholars made power point presentations on the research conducted with their assigned research mentor. They were all expected to present their research projects at the International Symposium on Recent Advances in Environmental Health Research that is held every year during the month of September. **Table 11** shows an over view of scheduled activities during the 2015 Summer Research Institute program, and **Table 12** shows the list of presentations made by DoD scholars and JPSD teachers during the closing program session.

Summer Immersion Program: The Summer Immersion Program helped the DoD Fellows to design, prepare their science and engineering fair projects. The sessions included identifying topics, literature searches to support their projects, identifying materials to conduct their experiments, collecting and analyzing data, research design and methods. During the course of the program eight students participated in the MS Regional Science Fair and a total of seven advanced to the state fair competitions. In addition to preparing science/engineering fair projects, the K-12 Scholars went on educational field trips which were STEM related. These experiences provided the students the opportunity to see how the various STEM related skills are being utilized in the workforce.

Summer Bridge Program: This activity was designed to recruit incoming freshmen STEM majors and assist them in transitioning from high school to college and to enhance their science, and mathematics skills. The students who participated in the Summer Bridge Program made significant improvement in STEM courses. Due to another summer bridge program, the numbers were low in years 2-3, but in year 4 we were able to recruit 33 students. This was due to collaborations with the recruitment office, participating in career and college fairs, and offering room and board as an option and the increase in the stipend. **Table 13** shows an overview of strategic activities implemented during the 2015 Summer Bridge Program, and **Table 14** shows some key

features of the Bridge to Success Friday Series. **Table 15** is a list of Summer Bridge participants throughout the grant period.

6. Offer research mentoring and professional enrichment experiences to K-12 and undergraduate STEM students…**by engaging students in mentored research during the academic year and summertime.**

At previously described, this specific aim has been fully achieved at Jackson State University. DoD Scholars were assigned to research mentors who advised and helped them in research training in their respective laboratories. Hence, students were engaged in specific research projects in their mentors' labs during the academic year. Additionally, they participated in the Summer Research Institute as described above. To expand their experiential learning skills, seven of the sixteen DoD scholars were placed for external internships at other institutions of higher learning, national laboratories and/or industry.

At Hinds Community College DoD scholars met with their mentors once a month to discuss issues and current topics relating to STEM education. Students were assigned mentors who helped and provided tutoring in Physics, Chemistry, Computer Science, and Mathematics. They were also advised on career opportunities as well as on the process for transitioning to STEM programs at Jackson State University after obtaining their associate degrees.

Outcome: As previously mentioned the DoD Scholars were paired with a faculty researcher within their respective program of study. The scholars completed research projects and presented posters and oral presentations at yearly conferences. During the summer months the 5 JPSD teachers and DoD Scholars participated in the Summer Research Institute to work on on-going research or new research projects. The scholars and teachers had the opportunity to present their projects at local and international conferences. Due to the students' engagement in research at JSU, they used this experience to leverage their opportunities in submitting applications to graduate and professional schools. The faculty researchers also served as mentors for the DoD Scholars which helped them to focus on completing their programs of study and deciding what they wanted to do after graduation from the University **[Table 6]**.

7. Facilitate the transition of JPSD students to college, of HCC students to JSU, and of JSU students to undergraduate students to graduate schools… **by implementing academic year and summer developmental and research activities clearly tailored toward student achievement in STEM disciplines.**

To address this goal we implemented a Summer Bridge Program to facilitate the transition of high school students to college. This program involved participants selected from a pool of freshman students admitted to JSU; based on their ACT scores and their interest in pursuing a degree in Science, Technology, Engineering and Mathematics education. The schedules of daily activities were carefully planned to

include basic introductory courses in English, Physics, Biology, Chemistry, Mathematics, and English communication. In addition to JSU faculty providing formal training through the delivery of these courses, continued efforts were made to secure other speakers from the Division of Student Life which included: Honors College, Counseling Services, Community Engaged Learning, Campus Police, Campus Ministries, Financial Aid, the Richard Wright Center for the Written Word, a tour of CSET facilities (labs, etc.), and an overview of grant funded opportunities within the College of Science, Technology and Engineering and these sessions were called Bridge to Success Fridays.

During the closing of program, students were grouped by subjects and required to make presentations based on their lessons in Biology, Chemistry, English, Mathematics and Physics. Each of the groups gave excellent PowerPoint presentations outlining what they had learned in these sessions. The students were presented with a certificate for successful participation in the Summer Bridge Program. Also, the results of pre and post tests administered to participating students indicated that all of the students made higher scores on the post tests.

At Hinds Community College, this programmatic goal was also addressed by working with HCC to implement strategies to facilitate the transition of DoD scholars from HCC to JSU. Resultantly, in the fall of 2014 five HCC students transferred to JSU. These scholars met with STEM department chairs at JSU to discuss their programs of study.

During the grant reporting period, JPSD teachers participated in professional development activities at Jackson State University. Activities were tailored toward enhancing their science and mathematics and computer knowledge and pedagogical skills. They were also engaged in research during the summer of 2015 as in previous years. The JPSD teachers attended the following conferences:

- 2013 National Association of Biology Teachers (NABT) Conference, Atlanta, GA
  Presentation: “Wow Biology XV”- the teachers discussed inexpensive, yet effective and fun instructional activities for secondary biology instruction. The presentation was held in conjunction with the Mississippi Association of Biology Educators (MSABE).

- 10th International Symposium on Recent Advances in Environmental Health Research, Jackson, MS (Ms. Desma Kelly, Mrs. Ebonie Butler, Ms. T. McKinney, and Ms. Tammy Cox) participated in the poster presentation. In addition to the teachers three DoD Fellows (k-12) students placed in the High School Poster Division: Deborah Luckett (Jim Hill HS), James Bennett (Provine HS) placed 3rd and Sara Bibbs (Jim Hill HS) placed 2nd.

- Vernier Software & Technology Professional Development Workshop, Jackson, MS
  Presentation Title: “Lab Quest 2” focused on training teachers how to incorporate and use data-collection devices and sensors into their curricula to increase the teaching and learning of science subjects.

- 2014 National Science Teachers Associations (NSTA) Conference, Boston, MA. As part of a special session arranged by the Association of Multicultural Science Education (AMSE), the team of JPSD teachers made a presentation entitled: “Enhancing a STEM Culture through Research Teams.” The group discussed how learning communities and research teams such as CESTEME have helped teachers to teach science more effectively to students in low performing schools.

  In 2015, the team of JPSD teachers made a presentation entitled: “Enhancing a STEM Culture through Research Teams.” The group discussed how learning communities and research teams such as CESTEME have helped teachers to teach science more effectively to students in low performing schools. The JPSD STEM teachers and the DoD Scholars also participated in the 2015 Summer Research Institute as indicated above (June 8-July 17, 2015).

  Outcome: This specific aim was substantially achieved: (1) One hundred percent of the of the K12 DoD Fellows graduated from high school and twenty-three of the DoD Fellows are currently enrolled in College and two are in Basic Army Training with plans to return to a university in the Spring. (2) Five of the HCC DoD Scholars are currently enrolled at Jackson State University and pursuing a STEM major. Twelve of the JSU Cohort of DoD Scholars graduated in spring 2015. (3) Of the fifteen DoD Scholars, eleven graduated from JSU in spring 2015, and one graduated in fall 2015. Of these twelve who graduated, six are pursuing Master of Science degrees at graduate schools, one is pursuing the doctor of medicine in dentistry, two are teaching in a public school, and two are employed in industry. The three remaining scholars will graduate within the next year.

D. <u>Overall Impact</u>

Jackson State University

- The Center of Excellence at Jackson State University is striving to make an impact at the three institutions funded by the grant (JSU, HCC and JPSD). Although, there were some difficulties in jump starting its activities in Year 1 we all made great strides in moving forward with the implementation of its important programmatic activities; hiring all key personnel, establishing/enhancing student resources centers, enhancing STEM infrastructure and programs, recruiting DoD Fellows and DoD Scholars, engaging students in tutoring, Saturday Academy, Academic Year research, Summer Bridge Program, Summer Immersion Program, and Summer Research Institute, and engaging teachers in professional development. The PI, Co-PIs, and program coordinators at each of the institutions are dedicated to the program and their dedication is reflective in our accomplishments and successful implementation of program activities.

- Leverage from DoD support of the Center of Excellence in STEM Education has allowed Jackson State University to be successful in becoming one of the only 17

institutions in 2015 to receive a competitive grant funding from the Department of Education under the First in the World Program. Our proposal entitled “Integrated STEM Experiences for All Students – A Multilevel Transformation” received a $2.98 million funding for 4 years to implement strategic activities that will improve teaching and learning in STEM through multidisciplinary research, innovation, education, and engagement. This funding will not have been possible without the leverage of existing resources of DoD Center of Excellence in STEM Education at JSU. Hence, the foundational support from DoD has made and will continue to make a tremendous impact on the continued development of STEM pipeline and STEM infrastructure at JSU.

- As a result of the CESTEME program at JSU and the publicity of the program activities, other high school students and parents are seeking to get their children involved in STEM. Additionally, there is an increased interest among the JSU undergraduate population to become involved in the program as well. The Boy Scouts of America and an organization seeking to promote STEM for Boys of Color has sought the expertise of Dr. Paul Tchounwou, the Principal Investigator. The JSU Program Manager has attended several recruitment events to promote the Summer Bridge Program.

  Jackson Public School District

  One hundred percent of our K-12 DoD Scholars graduated from high school. Eleven of the twenty-five students ranked in the top ten percent of their class. Karanja Matory, Alexis Shakespeare (Valedictorian) and Simeon Taylor (Salutatorian) represented Provine High School. DeBorah Luckett (Valedictorian), Sara Bibbs (Salutatorian) and Jaylen Davis represented Jim Hill High School. Kelsey Figures and LaShayla Yates represented Wingfield High School. Courtney Brent, Kira Rollins and Triniti Taylor represented Lanier High School. Thirty three percent of students increased in their ACT score by 3 points or higher. All twenty-five students were accepted into a college in the state of MS and eleven of the DoD Fellows are currently attending Jackson State University.

  Carah Young of Wingfield High School was featured in Jackson Free Press’ “Amazing Teens 2015” article. The article highlighted her academic and social accomplishments, as well as her roles in the National Honor Society, student body and Reserve Officer Training Corps (ROTC). Ms. Young plans to pursue a career in biometric engineering.

  Karanja Matory of Provine High School and Anthony Hunter of Lanier High School were both featured on WAPT News Channel 16’s Scholar of the Week. This commercial highlighted their academic, athletic and social success. Mr. Matory and Mr. Hunter are both currently enrolled at Jackson State University.

  District and National Highlights: Two of the CESTEME team members have been nominated for board appointments with the Association of Multicultural Science Education, an Affiliate of the Association (AoA) of the National Science Teachers

Association. Elections will be held at the 2016 NSTA Conference in Nashville, TN. Jackson Public Schools Superintendent, Dr. Cedric Gray honored the entire CESTEME team with the Golden Bow Tie Award of Excellence for our scholarly merit and contributions at the 2015 NSTA Conference.

Hinds Community College

- The STEM programs at Hinds Community has grown because of their focused approach to mentoring and tutoring not just CESTEME students but any students who wanted tutoring in STEM courses. The establishment of the program at HCC has helped tremendously in the development of STEM infrastructure and the training and transitioning students to BS degree programs in STEM.

F. Personnel

Key personnel of the Administrative team include the Principal Investigator; Dr. Paul Tchounwou who provided a strong leadership to ensure that the academic activities of the CESTEME program are implemented; Mrs. Constance Martin, the DoD Program Manager who effectively managed the day-to-day activities of the Center of Excellence, coordinated activities, and interactions with the other project coordinators. Dr. Theresa Hamilton was the Co-PI at Hinds Community College and she oversaw the activities of the HCC STEM program at the Raymond campus along with the Project Coordinator, Mr. Jason Webb. Mr. Wilbur Walters, JPSD Deputy Superintendent has retired in 2014 and was replaced by Dr. Lorene Essex who served as Co-PI at the Jackson Public School District overseeing the STEM program at JPSD with the Project Coordinator, Dr. Preston Robinson. During the reporting period all key personnel were in place. They all worked hard to ensure that the programmatic activities of the Center are implemented effectively.

Advisory Committees:

Members of the Internal Advisory Committee (IAC) consist of the department chairs in the College of Science, Engineering and Technology:

Dr. Ramzi Kafoury, Interim Chair, Department of Biology
Dr. Hongtao Yu, Chair, Department of Chemistry
Dr. Tor A. Kwembe, Chair, Mathematics
Dr. Mehri Fadavi, Interim Chair, Physics
Dr. Mahmoud Manzoul, Chair, Computer Engineering
Dr. Farshad Amini, Chair, Civil and Environmental Engineering

Members of the External Advisory Committee (EAC) are as follows:

Dr. Evelyn Leggette, Provost and Senior Vice President of Academic and Student Affairs
Dr. Abdul Mohammad, CSET Dean Emeritus
Dr. Daniel Watkins, Dean, College of Education and Human Development

G. CESTEME Program Evaluation

During the grant period, a yearly evaluation was made by the External and Internal Advisory committee members based upon the review of programmatic activities and the level of accomplishments. Every year, during their joint meeting (IAC and EAC), Dr. Paul Tchounwou, PI and Center Director along with Mrs. C. Martin, JSU Program Manager, Dr. Preston Robinson, JPSD Coordinator and Mr. Jason Webb, HCC Coordinator gave power point presentations on the specific activities carried out during the year. The committee members would then asked questions, and assessed if the activities were aligned with the specific aims of the grant, and if these activities were implemented in a timely and cost-effective manner. Based on their evaluations, the committee members also made specific recommendations to improve the program effectiveness and impact.

Some of their major recommendations for continuous improvement included: (1) Meeting with program directors of other College-sponsored K-12 programs to develop a plan for better integration of summer activities, and to share the best practices in student recruitment, mentoring and training. (2) Administering a pretest and a post-test to the 2014 Summer Bridge participants to determine the level of knowledge gained in Mathematics, Biology, Physics, English, and Chemistry as a result of their participation in the Program. This will also provide professors a basis for redesigning future activities to enhance student knowledge. (3) Providing campus housing for the Summer Bridge Program participants. (4) Requesting DoD approval for re-budgeting within the grant award to increase the stipend of DoD Fellows from $250 to $500 per semester, and of DoD Scholars from $600 to $750 per month, in order to become competitive with other sponsored programs in the JSU College of Science, Engineering and Technology.

The advisory committee members were in unanimously pleased to know that all program activities were moving forward according to the specific aims of the grant. In subsequent meetings, committee members were also pleased to see that their previous recommendations for strengthening the Center's activities were addressed in a timely manner. They commended the program administration and the faculty for the great work that has been accomplished, and encouraged the team to take full advantage of the unique opportunity provided by DoD support to make a significant contribution in workforce development in STEM areas of relevance to the DoD mission. The administrative team was highly committed and had made tremendous efforts to strengthen the Center's activities in order to recruit, mentor and train the new generation of global leaders in important STEM areas of relevance to the DoD mission. The advisory committee also commended Dr. Tchounwou and the administrative staff for their strong commitment and dedication to the program. Certainly, the work completed as a result of the DoD grant has made a tremendous impact at all partnering institutions (JPSD, JSU, and HCC), and significantly contributed to the development of the STEM workforce of the future.

H. Impact Statements from DoD Scholars.

In spite of a few students being terminated from the program due to poor academic performance the students who remained as DoD Scholars have had great success not only in the CESTEME program but at Jackson State University and Hinds Community College. Listed below are few of their statements:

- **Chuks Agusiegbe, Jr.** - CESTEME has impacted me deeply thus far in my early matriculation at Jackson State University. The CESTEME program has helped me gain valuable knowledge in research en route to my goal of going to medical school. In my spring semester I worked alongside my mentor, Dr. Clement Yedjou, and I worked with the HL-60 and MCF-7 cells to try and discover why cells go through apoptosis to see if we can try to stop cell suicide. I am proud to say that I finished by freshman year with a 3.6 grade point average. I am grateful that I was selected to be in CESTEME as a DoD Scholar.
- **Jordan Barber** – CESTEME has motivated me to continue to keep my grades up and maintain an overall balance in my life. I have been exposed to conferences, and special lectures that are helping me through my matriculation at JSU in the most positive way. The CESTEME program is positioning me to be successful in graduate school and in the world of work.
- **Terriona Cowan** - Being a member of the CESTEME Cohort group has impacted my life as a student in the most positive way. The experience has made me sharper in the area of research and also in the classroom setting. Whenever, I finish a research project I feel as if I am continuously on the path toward greatness.
- **Justin Griffin** - Being a part of the CESTEME Cohort has given me the motivation to strive for the best in my academic career. I have researched with some renowned researchers who are nationally and internationally recognized scientists and engineers.
- **Shontrice Garrett** - Being a part of the CESTEME program has inspired me to keep my GPA high, give back to others and positioned me around a group of like-minded peers.
- **Brittany Hailey** – I never would have guessed there were so many resources readily available to myself and other students. Being in CESTEME has helped me to connect with people who are willing to help now, and even after I graduate. Being in CESTEME has also helped me to stay focused on my studies, since I have to maintain a 3.0 GPA to remain in the program.
- **Porsha Newell** - There is nothing like working in the lab and viewing the cells under the microscope. I enjoy working with member of my research group and being in CESTEME has given me the boost to continue to work hard in school and never think something is too hard. I appreciate this program and the opportunity it has afforded me and I will continue to show great appreciation.
- **Trey Parker -** The CESTEME program has given me a better work ethics and has helped me to better prioritize my responsibilities.
- **Deuntae Sheard -** During the Spring semester my mentor taught me Linear Algebra and this is essential to the research project we are working on Statistic Machine

Learning. Being in the CESTEME program has helped me tremendously because I was provided with a professional mentor who has been where I am trying to go.

- **Jheena Victorian** - CESTEME has also been a significant factor for me personally because it has given me an opportunity to do research and have a hands-on experience in the lab. CESTEME also provides various resources such as tutoring, community service hours, and financial opportunities. Working with our mentors as well as the faculty and my fellow group members has been a great experience in the CESTEME program.
- **Jeremy White** - Being a part of this program has already been beneficial and I can't wait to see what year 2 will bring.
- **Russell Girault** - As a STEM student who is preparing to graduate and has participated in this program, I can happily say that I have seen it help me and my fellow STEM classmates. The tutoring in difficult subjects such as chemistry, mathematics, and physics has really proven to be a useful tool to get the most out of the classroom and really get a grasp on the material. Another huge benefit is the summer enrichment courses offered. These courses give valuable insight into the more difficult areas of that particular class without actually being graded on the material. This really helps jump start my studies and helps me begin to grasp hard concepts before the fall semester actually begins. I am very thankful to be a part of the STEM program and have gotten invaluable use out of the benefits it offers.
- **Edward Williams** - I became a member of the STEM Program, majoring in mathematics, during the spring semester of 2015. Honestly I joined at first because I saw the large amount of money that I could get, and all I had to do was keep being a good student. While the money is good, over the course of this semester, I have received benefits that money can't buy. My biggest reward for being in STEM was not the money, but the critical thinking skills that I have obtained from the enrichment classes taught by Jason Webb. Organic chemistry was something that I never saw myself becoming interested in. Well after taking a couple of enrichment classes, I have become a junkie for the thrill the challenge that organic chemistry makes. Mr. Webb teaches the class in such a way that the information is enjoyable to learn, and sticks in your head. Towards the end of the enrichment class he started to ask us more questions that made us use our critical thinking skills and apply them to the information that we just learned that day. So as I look back on this semester, I will miss the exciting and challenging enrichment classes and the funny STEM meetings that we have. I will use these great skills in the future as I continue to get my degrees in mathematics. It is a shame that this program is ending because it has help me become a brighter and more critical thinking student.
- **William Patterson** - Mr. Jason Webb and the STEM program at Hinds CC has greatly benefited me in my time here at hinds. They have opened doors for me that otherwise wouldn't have been opened. They have led me to meet people that have helped me academically as well as professionally. I hope to continue in the STEM program here at Hinds and at Jackson State in the future.
- **Octavia Pendleton -**My major is Environmental Science/Chemistry. The summer program has helped me to better understand some of the material I did not understand during the regular semester. We went at a slower pace that helped me to grasp the

material, and apply to problems I may have. Also the summer program has helped me to answer any questions I had about any material I covered during the regular semester. I feel more prepared and ready to continue my education.

- **Imani Nelson** - My participation in the CESTEME made a significant difference in my matriculation at JSU. The research training under the tutelage of Dr. Clement Yedjou provided me with an experience that will always be a part of me. The financial support helped me to meet academic needs as well as personal needs. I didn't have to worry about seeking employment outside of the University which allowed me to remain focused on my studies. In addition to the academic support, and research opportunities I formed bonds with the other DoD Scholars that will last a lifetime.
- **Devin Stewart** - I believe that my participation in research helped me when I went on summer internships. I was ahead of my group because when certain STEM concepts/terms were used I was already familiar with them and this gave me an edge over the other students. Dr. Sutton was my mentor and his support was invaluable in helping me to learn about research methods, and having the opportunity to present at workshops is an experience I will never forget. I applied and was accepted in dental school at MS University Medical Center. I am entirely grateful for the opportunities provided to by the CESTEME program.

LIST OF TABLES

TABLE 1
Infrastructure Enhancements at Partner Institutions

YEAR	JACKSON STATE UNIVERSITY	HINDS COMMUNITY COLLEGE	JACKSON PUBLIC SCHOOL DISTRICT
2011-2012	The Center of Excellence's Student Resource Center was opened. The Center is equipped with 3-Dell Desktop Computers, 2- Dell Laptop Computers, 1-HP Black/White Printer, 1- HP Color Laser Printer, a wall mounted projection screen, 1-portable projector, 2-file cabinets, 3-bookshelves, 18-office chairs, 1-fax machine, and the room is wired for wireless internet connection.	A computer laboratory was created for the STEM program and it is equipped with 10 new HP computers and loaded with chemistry, computer programming, and mathematics learning software. It is also equipped with overhead projector for multimedia capabilities such as power point. Additional supplies were purchased for chemistry and physics (new whiteboards, visible spectrometers, pH meters, and melting point determination apparatuses).	Graphing calculators and laboratory supplies were purchased for teachers and students.
2012-2013	Test preparation Study books such as GRE Books and Vocabulary Flashcards, Praxis, ACT Study Guides, Cliff Notes for Physics, Chemistry, and Calculus were ordered.	The 3-D Projection system was installed and 3-D software programs for scientific visualization were loaded into the system	Several equipment purchases were made that included 6-Ken-A-Vision microscopes, and supplies such as Cell zone molecular puzzles, and mitosis sequencing kits. Vernier Software technologies with 35 Lab Quest 2 devices and probes and Logger Pro 3 Software were ordered.
2013-2014	21-Lenovo ThinkPad Laptop computers were ordered and made available for student use.	The computer lab that was established in during year one continued to be used by STEM students multiple times during the week.	High resolution digital and stereoscopic microscopes were purchased for JPSD schools that offer forensic science programs.
2014-2015	25 Dell desktop computers were added to the Center of Excellence Student Resource Center. In addition to equipping the resource center, scientific equipment was ordered to improve the research and teaching laboratories (2- 18.2 CU FT Refrigerator/Freezer, 1-Centrifuge, 1-Biological Safety Cabinet, 1- pH Meter, pH, 1-Microcentrifuge, 1-incubator (direct	The computer laboratory was expanded (renovated) to a much larger space and equipped with 23 desktop computers, a LCD Projector, and a laser printer. The computers included 7-iMac Desktop computers were also added and 2-iMacPro Book laptop computers.	The additional laboratory supplies were ordered for laboratory science classes such as chemicals, beakers, and flask glassware, personal protection equipment, dissection specimens, electrophoresis equipment and various other items. For Physical Science classes, items such as magnetizers, electrostatics kits, density identification kits, stethoscopes, Newtonian

	heat), 1 incubator, carbon dioxide, 1-digital inverted fluorescence microscope, 1-Collection system, vacuum aspirator, 1 inverted microscope, 1-platform shaker system, 1-UV/Vis spectrophotometer, and 1 PK- Thermo Scientific Finn pipette.	Other equipment was also added in Organic and General Chemistry labs (4-MelTemp Melting point apparatus, 24 Brisk Heating mantles and Rheostats, 30 Cork Rings, 1-Eagle Acid Cabinet, 4-Ohaus Analytical Balances, 10-Fisher Scientific Hot plates, 10-Vortexes, 80 Ring stands, 100 Flasks, 100-stirring rods, 1- Fisher Brand water Bath and 1-Brinkman Block Heater, 4-MelTemp Melting Point Apparatus, 400 Various Clamps for labs).	demonstrators, muscular system charts, systems of the human body series, classifying living things laboratory kits, Taxonomic key kits and various other items were purchased.

Table 2
Selected Support Mechanisms for K-12 and Undergraduate STEM students

YEAR	JACKSON STATE UNIVERSITY	HINDS COMMUNITY COLLEGE	JACKSON PUBLIC SCHOOL DISTRICT
1-4	An orientation meeting was held with the initial 14 DoD Scholars, which included department chairs, mentors and students. Thereafter, each semester the students were advised to meet with department advisors to select classes and to make sure they stayed on track to meet the University requirements. In this process they were required to meet with the program manager to ensure they were meeting program requirements as well. The students also met for monthly CESTEME meetings, and they were kept abreast of STEM seminars and conferences that they could attend and present their research projects.	The STEM Advisors/Mentors met weekly with the HCC DoD Scholars. The advisors/mentors monitored the students' academic progress as well as provided them with tutorial and enrichment activities in their STEM courses to ensure success in their courses and that they stayed on track to graduate.	The JPSD teachers provided afterschool tutoring for any student who needed tutoring in STEM courses.
1-4	In addition to departmental advisement as a part of the CESTEME program requirements, the DoD Scholars had to submit mid-term and final grades to the program manager. The Cohort of DoD Scholars also formed peer-to-peer tutoring groups. The College of Science, Engineering and Technology instituted the Scholar's Academy which included tutoring in all STEM related courses. The DoD Scholars were advised to utilize this service as well.	In addition to the weekly sessions, the HCC DoD Scholars had the opportunity to participate in the Summer Enrichment classes for STEM students. Enrichment courses were offered in computer programming, chemistry, physics and pre-calculus. The summer enrichment sessions was designed to increase the students' knowledge in the aforementioned STEM areas and to prepare them for the upcoming semester courses.	

TABLE 3
K12 DOD FELLOWS' ACT SCORES REPORT

	First Date	Math	Science	Composite	Last Date	Math	Science	Composite	Comp. Increase
Sara Bibbs	06/12	21	20	21	02/15	24	22	25	4
Jaylen Davis	06/13	19	21	20	10/14	25	24	24	4
Deborah Luckett	09/12	18	19	19	12/14	23	21	22	3
Pablo Williams, Jr.	06/12	17	19	18	12/14	19	18	18	0
Victoria Williams	06/12	17	14	16	12/14	19	15	18	2
Marcus Barksdale	06/13	15	16	17	02/15	16	19	18	1
Courtney Brent	02/13	19	19	17	12/14	19	21	20	3
Anthony HunterJr.	06/13	22	19	19	02/15	22	20	20	1
Kira Rollins	02/14	16	12	18	02/15	15	20	19	1
Triniti Taylor	06/12	22	19	18	02/15	19	22	19	1
Vinnesha Bolton	06/13	15	16	15	02/15	14	18	17	2
Tullous Burrow	12/14	21	22	20	02/15	16	20	18	-2
Arie Johnson	Not Reported								0
Kayla Smith	10/14	16	15	18					0
James Bennett	06/13	18	17	17	10/14	18	19	18	1
Roshondra Edwards	04/13	16	15	14	12/14	18	18	18	4
Karanja Matory	10/11	17	14	17	10/14	20	19	22	5
Alexis Shakespeare	04/14	22	18	19	02/15	19	21	19	0
Simeon Taylor	06/13	22	21	20	12/14	24	22	23	3
Kholbi Coleman	04/14	18	18	20	10/14	18	20	21	1
Kelesy Figures	04/14	16	19	15					0
Jamal Foster	04/14	23	23	24					0
Lashayla Yates	04/13	18	18	18	10/14	18	20	20	2
Carah Young	06/13	14	11	14					0
Dawud Mohammed	Not Reported								0

	Avg. Increase	1.44

TABLE 4
CURRENT STATUS OF JSU DoD SCHOLARS

DOD SCHOLAR	MAJOR	GRADUATION	Graduate school	Career
Barber, Jordan	Computer Engineering	December 2015	No	Industrial pursuit Apple Company
Cowan, Terriona	Chemistry	May 2015	Jackson State University	Master of Science Chemistry
Fountain, Myeisha	Biology	May 2016		
Garrett, Shontrice	Mathematics	May 2015	Jackson State University	Master of Science in Teaching
Griffin, Justin	Civil Engineering	May 2017		
Gills, Kelli	Biology	May 2015	Morehouse School of Medicine	Master of Science in Medical Science
Hailey, Brittany	Meteorology	May 2015	Scripps Institution of Oceanography	Master of Science in Meteorology
Hemmingway, Tometrick	Civil Engineering	May 2015	No	Norfolk Southern Engineering Manager
Martin, Luther	Computer Engineering	May 2015		
Miller, Trenton	Mathematics	May 2015	Jackson State University	Master of Science in Technology Education
Nelson, Imani	Biology	May 2015		
Robinson, Kamron	Biology	May 2015	Morehouse School of Medicine	Masters in Medical Science
Stewart, Devin	Biology			Doctor of

		May 2015	University MS Medical Center	Dental Medicine Degree
Victorian, Jheena	Biology	May 2015		Master of Science
White, Jeremy	Chemistry	May 2016		

TABLE 5
Current Status of HCC DoD Scholars

YEAR	Student Name	MAJOR	Attending
Year 1	Jeremy White	Chemistry	Jackson State University
	Allan Harris	Computer Science	MS State University
	Cameron Brown	Physics	No response
	Ashley Nash	Meteorology	Jackson State University
	Ricky Brown	Physics	MS State University
Year 2	Sujan Duhal	Engineering	MS State University
	Roshan Singh	Microbiology	No response
	Keritan Shelby	Computer Science	MS State University
	Brittany Chisolm	Chemistry/Biochemistry	MS State University
	Russell Girault	Computer Science	MS State University
	Octavia Pendleton	Chemistry	Huntington College
Year 3	Kelsey Hill	Mathematics	Jackson State University
	Dorice Konoborita	General Engineering	Texas A & M University
	Jontay Reynolds	Mechanical Engineering	Jackson State University
	Ta'Ari Caldwell	Computer Science	Hinds Community College
Year 4	Daniel Powell	Computer Science	Hinds Community College
	Suzanne M. Jordan	Computer Engineering	Hinds Community College
	William Patterson	Civil Engineering	Hinds Community College
	Shane Savannah	Mathematics	Jackson State University
	Amelia Matthews	Chemistry/Forensics	Hinds Community College

TABLE 6
Current Status of K-12 DoD Fellows

STUDENT NAME	NAME OF HIGH SCHOOL	COLLEGE/ UNIVERSITY ATTENDING	MAJOR/Career Choice
Barksdale, Marcus	Lanier HS	Jackson State University	Civil Engineering
Bennett, James	Provine HS	Navy	
Bibbs, Sara	Jim Hill	University of Southern MS	Child Development
Bolton, Vinnesha	Murrah	Hinds CC, Raymond	General Education
Brent, Courtney	Lanier	University of MS	Accounting
Burrow, Tullous	Murrah	Jackson State University	Engineering
Coleman, Kholbi	Wingfield	Jackson State University	Computer Science
Davis, Jaylen	Jim Hill	Jackson State University	Biology
Edwards, Roshundra	Provine	Army Basic Training Fall'15	Ole Miss – Spring 2016
Figures, Kelsey	Wingfield	Hinds CC, Pearl, MS	General Education
Foster, Jamal	Wingfield	Army Basic Training Jackson State University	Fall 2015 Spring 2016
Hunter, Anthony	Lanier	Jackson State University	Biology
Johnson, Arie	Murrah	Holmes CC, Ridgeland	Occupational Therapy
Luckett, DeBorah	Jim Hill	Jackson State University	Engineering
Matory, Karanja	Provine	Jackson State University	Computer Science
Muhammad, Dawud	Murrah	Jackson State University	Civil Engineering
Rollins, Kira	Lanier	University of Southern MS	Speech Pathology
Shakespeare, Alexis	Provine	Jackson State University	Mathematics
Smith, Kayla	Murrah	Jackson State University	Mass Communications
Taylor, Simeon	Provine	University of Iowa	Actuarial Science
Taylor, Triniti	Lanier	Alcorn State University	Animal Science
Tchounwou, Hervey	Madison Central	Jackson State University	Computer Technology
Williams, Pablo	Jim Hill	Alcorn State University	Biology (Pre-Nursing)
Williams, Victoria	Jim Hill	Alcorn State University	Biology (Pre-Nursing)
Yates, LaShayla	Wingfield	Tougaloo College	Chemistry
Young, Carah	Wingfield	Hinds Community College (2016)	General Education (Engineering)

TABLE 7

SATURDAY ACADEMY ENRICHMENT SESSIONS
YEARS 1- 4

Semester	No. of Sessions	Total Yearly Sessions	Average Attendance
Spring 2012	9		25
Fall 2012	6	15	25
Spring 2013	9		22
Fall 2013	6	15	22
Spring 2014	7		25
Fall 2014	6	13	25
Spring 2015	7		
Total Sessions	43		

TABLE 8 - A

SATURDAY ACADEMY SCHEDULE - FALL 2014

9/06/14	9/20/14	10/04/14	10/18/14	11/01/14	11/15/14
9:00-11:00 OPENING PROGRAM	Arrival at 8:00 a.m. LEWAAC	8:45-8:55 am Arrival JAP 106	8:45-8:55 am Arrival JAP 106	8:45-8:55 am Arrival JAP 106	9:00-12:00 CLOSING PROGRAM
John A. Peoples Lecture Hall 209	High School/Community College Day- Lee Williams Athletic Assembly Center	9:00-10:00 Biology Group JAP 228 Drs. Ndebele, Sutton, Graham	9:00-10:00 Geo Technical Engineering Engineering Bldg. 102 Dr. Li Lin	9:00-10:00 Physics Mr. K. Greene JSH 207/209	Engineering Bldg. Auditorium ---------- RECEPTION Faculty Lounge
	10:05-10:15 BREAK	10:05-10:15 BREAK	10:05-10:15 BREAK	10:05-10:15 BREAK	1:00 pm DISMISSAL
	10:15-12noon High School/Community College Day- Lee Williams Athletic Assembly Center	10:15-12noon Biology Group JAP 228 Drs. Ndebele, Sutton, Graham	10:00-12noon Dr. Li Lin 102	10:00-12noon Physics Mr. K. Greene JSH 207/209	
	12:00-1:00 LUNCH	12:00-1:00 LUNCH	12:00-1:00 LUNCH	12:00-1:00 LUNCH	
	1:00-2:00 High School/Community College Day- Lee Williams Athletic Assembly Center	1:00-2:00 Chemistry Dr. D. Davis JAP Lab 542	1:00-2:00 Engineering Engineering Bldg. Room 102 Dr. Feng Wang	1:00-2:00 Mathematics Dr. R. Gentry JSH 106	
	2:00-2:10 BREAK	2:00-2:10 BREAK	2:00-2:10 BREAK	2:00-2:10 BREAK	
	High School/Community College Day- Lee Williams Athletic Assembly Center	2:15-3:00 pm Chemistry Dr. D. Davis JAP Lab 542	2:15-3:00 pm Engineering Dr. Feng Wang	2:15-3:00 pm Mathematics Dr. R. Gentry JSH 106	
	3:00 pm DISMISSAL	3:00 pm DISMISSAL	3:00 pm DISMISSAL	3:00 pm DISMISSAL	

TABLE 8-B

SATURDAY ACADEMY SCHEDULE – SPRING 2015

01/10/15	01/24/15	02/07/15	02/21/15	02/28/15	03/21/15	03/28/15
9:00-11:00 OPENING PROGRAM	**8:45-8:55 am Arrival JAP 106**	**8:45-8:55 am Arrival JAP 106**	**8:45-8:55 am Arrival JAP 106**	**8:45-8:55 am Arrival JAP 106**	**8:45-8:55 am Arrival JAP 106**	**9:00-12:00 CLOSING PROGRAM**
JAP ROOM 209	**9:00-10:00 CHEMISTRY Dr. D. Davis JAP 209**	**9:00-10:00 Science Fair JAP 228, 209 Drs. T. Wright & C. Yedjou Grad. Assts.**	**9:00-10:00 MATH Dr. Gentry JSH Room 106**	**9:00-10:00 ENGINEERING Dr. Li Lin Engineering Building Room 102**	**9:00-10:00 COMPUTER SCIENCE REAL TALK SYMPOSIUM JAP 209**	**12:15-1:00 RECEPTION**
	10:05-10:15 BREAK	**10:05-10:15 BREAK**	**10:05-10:15 BREAK**	**10:05-10:15 BREAK**	**10:05-10:15 BREAK**	**1:00 pm DISMISSAL**
	10:15-12noon CHEMISTRY	**10:15-12noon**	**10:15-12noon MATH**	**10:15-12noon**	**10:15-12noon COMPUTER SCIENCE**	
	12:00-1:00 LUNCH	**12:00-1:00 LUNCH**	**12:00-1:00 LUNCH**	**12:00-1:00 LUNCH**	**12:00-1:00 LUNCH**	
	1:00-2:00 BIOLOGY JAP 228 Drs. Graham, Ndebele, Sutton, Yedjou	**1:00-2:00 Science Fair Drs. T. Wright & C. Yedjou Grad. Assistants DoD Scholars Room 118 Comp Lab**	**1:00-2:00 PHYSICS Mr. K. Greene JSH Room 206/207**	**1:00-2:00 BIOLOGY JAP 228 Drs. Graham, Ndebele, Sutton & Yedjou**	**1:00-2:00 COMPUTER SCIENCE REAL TALK SYMPOSIUM**	
	2:00-2:10 BREAK	**2:00-2:10 BREAK**	**2:00-2:10 BREAK**	**2:00-2:10 BREAK**	**2:00-2:10 BREAK**	
	2:15-3:00 BIOLOGY (cont.)	**2:15-3:00 Room 118 Comp Lab Science Fair (cont.)**	**2:15-3:00 PHYSICS (cont.)**	**2:15-3:00 BIOLOGY (cont.)**	**2:15-3:00 COMPUTER SCIENCE REAL TALK SYMPOSIUM (cont)**	
	3:00 pm DISMISSAL	**3:00 pm DISMISSAL**	**3:00 pm DISMISSAL**	**3:00 pm DISMISSAL**	**3:00 pm DISMISSAL**	

TABLE 9

DoD Scholars and Research Mentors

DoD Scholar	Major	Research Mentor
Barber, Jordan	Computer Engineering	Dr. Kamal Ali
Cowan, Terriona	Chemistry	Dr. Zikri Arslan
Fountain, Myiesha	Biology	Drs. Anita Patlolla & Clement Yedjou
Garrett, Shontrice	Mathematics	Dr. Jana Talley
Griffin, Justin	Civil Engineering	Dr. Himangshu Das
Gills, Kelli	Biology	Dr. Barbara Graham, Dr. Kenneth Ndebele
Hailey, Brittany	Meteorology	Drs. Remata S. Reddy & Kentave Greene
Hemmingway, Tometrick	Civil Engineering	Dr. Danuta Leszczynska
Martin, Luther	Computer Engineering	Dr. Kamal Ali
Miller, Trenton	Mathematics	Dr. Ying Yang
Nelson, Imani	Biology	Dr. Clement Yedjou
Robinson, Kamron	Biology	Drs. Anita Patlolla & Dwayne Sutton
Stewart, Devin	Biology	Dr. Dwayne Sutton
Victorian, Jheena	Biology	Dr. Dwayne Sutton
White, Jeremy	Chemistry	Dr. Zikri Arslan

TABLE 10
DOD SCHOLARS
ACADEMIC YEAR RESEARCH PROJECTS & MENTORS 2012-2015

DOD SCHOLAR	MAJOR	RESEARCH MENTOR	RESEARCH TOPIC(s)
Barber, Jordan	Computer Engineering	Dr. Kamal Ali	(1) Online Advisement Advising Assistant (2) A Gimbaled Platform for Micro Aerial Vehicle Autopilot Simulation and Calibration (3) A Hardware in the Loop Simulator for Multi Agent Unmanned Aerial Vehicle Environment (4) Cyber Security
Cowan, Terriona	Chemistry	Dr. Zikri Aslan	Assessment of Particle Morphology on Toxicity of Titanium Dioxide Nanoparticles on Artemia Salina
Fountain, Myeisha	Biology	Dr. Clement Yedjou	The Therapeutic Effects of Vernonia Amydalina to Human Breast Cancer (MCF-7) Cells
Garrett, Shontrice	Mathematics	Dr. Jana Talley	Mobile Devices as a Component of a Student Response System in Undergraduate Mathematics Classrooms
Griffin, Justin	Civil Engineering	Dr. Himangshu Das	(1) Cyclones in the Atlantic and Indian Oceans (2) An Analysis of the Effectiveness of the Construction Methods and Materials to Resist Cyclonic Force
Gills, Kelli	Biology	Dr. Barbara Graham	(1) The Effects of Beta Estradiol on A431 Epidermoid Carcinoma Skin Cells (2) Cell culturing
Hailey, Brittany	Meteorology	Dr. Remata Reddy	Air Quality in Mississippi
Hemmingway, Tometrick	Civil Engineering	Dr. Danuta Leszczynski	Organic compounds in soil and lakes of Mississippi
Martin, Luther	Computer Engineering	Dr. Kamal Ali	Re-Aggregation Techniques for Big Data and autonomous unmanned aircraft development
Miller, Trenton	Mathematics	Dr. Ying Yang	(1) NBA Data Differential instruction savy IPad- Developmental learning (2) Teaching Underprepared Minority Students
Nelson, Imani	Biology	Dr. Clement Yedjou	Vernonia Amygdalina cytotoxic damage and activation of caspase-3 in Human Leukemia (HL-60) Cells
Robinson, Kamron	Biology	Dr. Dwayne Sutton	A Role for Signal Transducer and Activation of Transcription (STAT3) in Necroptosis and Renal Ischemia Reperfusion
Stewart, Devin	Biology	Dr. Dwayne Sutton	Necroptosis in Human Renal Proximal Tubular (HK-2) Cells A Role for Signal Transducer and Activation of Transcription (STAT3) in Necroptosis and Renal Ischemia Reperfusion

Victorian, Jheena	Biology	Dr. Dwayne Sutton	Necroptosis in Human Renal Proximal Tubular (HK-2) Cells A Role for Signal Transducer and Activation of Transcription (STAT3) in Necroptosis and Renal Ischemia Reperfusion
White, Jeremy	Chemistry	Dr. Zikri Aslan	ICP-MS Profiling of MS River Fish and Sediments and Comparison to Farm Raised Fish

TABLE 11

SUMMER RESEARCH INSTITUTE - SCHEDULE

June 8- July 17, 2015

WEEK 1

June 8	June 9	June 10	June 11	June 12
8:30-8:55 a.m. Arrival	9:00- Arrival Report to Mentors	9:00 –Arrival Report to Mentors	9:00 –Arrival Report to Mentors	9:00 –Arrival Report to Mentors
9:00-12:00 Opening Program Conference Room #441 John A. Peoples	9:00- 12:00 Review of Research Methods	10:00- 12:00 REVIEW Lab Safety Procedures L. Washington HAZ MAT Officer	10:00- 12:00 Scholars & Teachers with Assigned mentors	10:00- 12:00 Scholars & Teachers with Assigned mentors
Presentations Research Overview	10:30-10:40 BREAK	10:30-10:40 BREAK	10:30-10:40 BREAK	10:30-10:40 BREAK
Laboratory (Walk-thru)	1:00-3:00 Review of Research Methods	1:00-3:00 p.m. REVIEW Lab Safety Procedures L. Washington HAZ MAT Officer	1:00-3:00 p.m. Scholars & Teachers with Assigned mentors	1:00- 3:00p.m. Scholars & Teachers with Assigned mentors
12:00-1:00 LUNCH	12:00-1:00 LUNCH	12:00-1:00 LUNCH	12:00-1:00 LUNCH	12:00-1:00 LUNCH
3:00 p.m. DISMISSAL	3:00 p.m. DISMISSAL	3:00 p.m. DISMISSAL	3:00 p.m. DISMISSAL	3:00 p.m. DISMISSAL

WEEK 2

June 15	June 16	June 17	June 18	June 19
9:00 a.m. Arrival		9:00 –Arrival Report to Mentors	9:00 –Arrival Report to Mentors	9:00 –Arrival
RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR
DoD Scholars & JPSD Teachers Report to Mentors Review – Research Plans	10:30-10:40 BREAK	10:30-10:40 BREAK	10:30-10:40 BREAK	10:30-10:40 BREAK
DoD Scholars & JPSD Teachers Report to Mentors Review – Research Plans	RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR
12:00-1:00 p.m. LUNCH	12:00-1:00 p.m. LUNCH	12:00-1:00 LUNCH	12:00-1:00 LUNCH	1:00 p.m. DISMISSAL
3:00 p.m. DISMISSAL	3:00 p.m. DISMISSAL	3:00 p.m. DISMISSAL	3:00 p.m. DISMISSAL	3:00 p.m. DISMISSAL

Summer Research Institute – Schedule *continued*

WEEK 3 June22-26	WEEK 4 June 29-July 2	WEEK 5 July 6-10	WEEK 6 July 13-17
RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR	CLOSING PREPARATIONS Scholars & Teachers will begin preparations (power point presentations) for Closing Program
RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR	RESEARCH WITH ASSIGNED MENTOR	CLOSING PROGRAM Friday, July 17, 2015 10:00-1:00 p.m. John A. Peoples Room #228
RESEARCH WITH ASSIGNED MENTOR	University Closed Friday, July 3, 2015 4th of July Observance	RESEARCH WITH ASSIGNED MENTOR	CLOSING RECEPTION DISMISSAL

TABLE 12
2014 & 2015 Summer Research Institute
Research Presentations

Year	Presenters	Title/Mentor
2014	Ebonie Butler-Cheeks, Jheena Victorian, Pablo Williams, Jr., Victoria Williams	Finding a Role for Necroptosis in Renal Ischemia Injury Dr. Dwayne Sutton, Mentor
	Tammy T. Cox	Arsenic Trioxide-Induced Cell Cycle Arrest in Human Leukemia (HL-60) Cells, Dr. Clement Yedjou, Mentor
	Tanjanikia McKinney	Lead Induced Cell Death on HL-60 Cells During the Cell Analysis Dr. Clement Yedjou, Mentor
	Desma Kelly	Biochemical Analysis of Liver Enzymes in Sprague-Dawley Rats Exposed to Graphene Oxide Dr. Anita Patlolla, Mentor
	Terriona Cowan	Evaluation of Particle Morphology on Toxicity of Titanium Dioxide Nanoparticles on Artemia Salina Dr. Zikri Arslan, Mentor
	Jeremy White	Determination of Toxic Elements in River Fish via Acid Digestion/ICP-MS, Dr. Zikri Aslan, Mentor
	Tometrick Hemmingway	Determining Organic Compounds in Pine Cone Needles Using GS-MS, Dr. Danuta Leszczynska, Mentor
	Justin Griffin	Analysis of the Effectiveness of the Construction Methods and Materials to Resist Cyclonic Force Dr. Himangshu Das, Mentor
	Jordan Barber	Online Advisement System, Dr. Kamal Ali, Mentor
	Shontrice Garrett	Investigating the Benefits of Utilizing Mobile Devices in Freshman Level Mathematics Courses Dr. Jana Talley, Mentor
	Trenton Miller	How to Build a Model for NBA Games, Dr. Xing Yang, Mentor
2015	Myeisha Fountain	"Therapeutic Effects of Vernonia Amydalina to Human Breast Cancer (MCF-7) Cells" Dr. Clement Yedjou
	Tanjanikia McKinney Tammy Taylor	"Vernonia Amydalina Induced Cell Cycle Arrest in Human Breast Cancer (MDA-MB-231) Cells" Dr. Clement Yedjou
	Kelli Gills	"The Effects of Beta Estradiol on A431 Epidermoid Carcinoma Skin Cells" Drs. Barbara Graham & Kenneth Ndebele
	Jonathan Randolph	The Effects of Graphene Oxide in Two Different Biological Systems, Dr. Anita Patllola
	Eboni Butler Betty Davis	"Is There a Dual Role for STAT3 in the TNF Alpha Induced Necroptosis in Human Renal Proximal Tubular (HK-2) Cells" , Dr. Dwayne Sutton, Mentor
	Jeremy White	"ICP-MS Profiling of MS River Fish and Sediments and Comparison to Farm Raised Fish" Dr. Zikri Arslan, Mentor
	Trenton Miller	"Teaching Under presented Minority Students", Dr. Shirley Burnett, Mentor
	Shontrice Garrett	"Mobile Devices as a Component of a Student Response System in Undergraduate Mathematics Classrooms", Dr. Jana Talley, Mentor

TABLE 13

2015 SUMMER BRIDGE PROGRAM SCHEDULE

WEEK 1

TIME	MONDAY, JUNE 1	TUESDAY, JUNE 2	WEDNESDAY, JUNE 3	THURSDAY, JUNE 4	FRIDAY, JUNE 5
9:00 am 10:15 am **GROUP 1**	OPENING PROGRAM ENGINEERING BUILDING AUDITORIUM 100	Intro to Chemistry Dr. D. Davis JAP 209	Intro to Eng. Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	
9:00 am 10:15 am **GROUP 2**	OPENING PROGRAM ENGINEERING BUILDING AUDITORIUM 100	English Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	English Ms. N. Didla OIAB 125	
10:15 am 10:30 am	**BREAK**	**BREAK**	**BREAK**	**BREAK**	**BREAK**
10:30- 11:45 **GROUP 1**	**TOUR** College of Science, Engineering & Technology Facilities	Intro to Eng. Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	Intro to Eng. Comm. Ms. N. Didla OIAB 125	
10:30- 11:45 **GROUP 2**	**TOUR** College of Science, Engineering & Technology Facilities	Intro to Biology Dr. M. Begonia JAP 320	Intro to Eng. Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	
11:45 am- 1:00 p.m.	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**
1:00 pm- 2:45 pm **GROUP 1**	CESTEME Bridge Program EXPECTATIONS Old Industrial Arts Building 125	Intro to Technology Dr. F. Tuluri JYW 202	Intro to Math Dr. R. Gentry JAP 106	Intro to Math Dr. R. Gentry JAP 106	
1:00 pm 2:45 pm **GROUP 2**	CESTEME Bridge Program EXPECTATIONS Old Industrial Arts Building 125	Intro to Cybersecurity Dr. A. Tanner JAP 125	Intro to Math Dr. B. Diatta JAP 108	Intro to Math Dr. B. Diatta JAP 108	

JAP = John A. Peoples Building JSH = Just Science Hall OIAB = Old Industrial Arts Bldg. JYW= J.Y. Woodard Building
ENB = Engineering Building

WEEK 2

TIME	MONDAY, JUNE 8	TUESDAY, JUNE 9	WEDNESDAY, JUNE 10	THURSDAY, JUNE 11	FRIDAY, JUNE 12
9:00 am 10:15 am **GROUP 1**	Intro to Eng. Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	Intro to Eng. Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	
9:00 am 10:15 am **GROUP 2**	Intro to Chemistry Dr. D. Davis JAP 209	Intro to Eng. Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	Intro to Eng. Comm. Ms. N. Didla OIAB 125	
10:15 am 10:30 am	**BREAK**	**BREAK**	**BREAK**	**BREAK**	**BREAK**
10:30- 11:45 **GROUP 1**	Intro to Biology Dr. M. Begonia JAP 320	Intro to Eng. Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	Intro to Eng. Comm. Ms. N. Didla OIAB 125	
10:30- 11:45 **GROUP 2**	Intro to Eng. Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	Intro to Eng. Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	
11:45 am- 1:00 p.m.	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**
1:00 pm- 2:45 pm **GROUP 1**	Intro to Physics Dr. R. Kalluru JSH 205	Intro to Cybersecurity Dr. A. Tanner JAP 125	Intro to Math Dr. R. Gentry JAP 106	Intro to Math Dr. R. Gentry JAP 106	
1:00 pm 2:45 pm **GROUP 2**	Intro to Physics Dr. R. Kalluru JSH 205	Intro to Technology Dr. F. Tuluri JYW 202	Intro to Math Dr. B. Diatta JAP 108	Intro to Math Dr. B. Diatta JAP 108	

JAP = John A. Peoples Building JSH = Just Science Hall OIAB = Old Industrial Arts Bldg. JYW= J.Y. Woodard Building
ENB = Engineering Building

WEEK 3

TIME	MONDAY, JUNE 15	TUESDAY, JUNE 16	WEDNESDAY, JUNE 17	THURSDAY, JUNE 18	FRIDAY, JUNE 19
9:00 am 10:15 am **GROUP 1**	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	FIELD TRIP USDA BIOLOGICAL RESEARCH LAB. STONEVILLE, MS
9:00 am 10:15 am **GROUP 2**	Intro to Chemistry Dr. D. Davis JAP 209	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	Intro to English Comm. Ms. N. Didla OIAB 125	FIELD TRIP USDA BIOLOGICAL RESEARCH LAB. STONEVILLE, MS
10:15 am 10:30 am	**BREAK**	**BREAK**	**BREAK**	**BREAK**	**BREAK**
10:30- 11:45 **GROUP 1**	Intro to Biology Dr. M. Begonia JAP 320	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	Intro to English Comm. Ms. N. Didla OIAB 125	FIELD TRIP USDA BIOLOGICAL RESEARCH LAB. STONEVILLE, MS
10:30- 11:45 **GROUP 2**	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	FIELD TRIP USDA BIOLOGICAL RESEARCH LAB. STONEVILLE, MS
11:45 am- 1:00 p.m.	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**
1:00 pm- 2:45 pm **GROUP 1**	Intro to Physics Dr. R. Kalluru JSH 205	Intro to Technology Dr. F. Tuluri J.Y. Woodard 202	Intro to Math Dr. R. Gentry JAP 106	Intro to Math Dr. R. Gentry JAP 106	FIELD TRIP USDA BIOLOGICAL RESEARCH LAB. STONEVILLE, MS
1:00 pm 2:45 pm **GROUP 2**	Intro to Physics Dr. R. Kalluru JSH 205	Intro to Cybersecurity Dr. A. Tanner JAP 125	Intro to Math Dr. B. Diatta JAP 108	Intro to Math Dr. B. Diatta JAP 108	FIELD TRIP USDA BIOLOGICAL RESEARCH LAB. STONEVILLE, MS

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ENB = Engineering Building

WEEK 4

TIME	MONDAY, JUNE 22	TUESDAY, JUNE 23	WEDNESDAY, JUNE 24	THURSDAY, JUNE 25	FRIDAY, JUNE 26
9:00 am 10:15 am **GROUP 1**	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP 209	CLOSING PROGRAM ENB 100
9:00 am 10:15 am **GROUP 2**	Intro to Chemistry Dr. D. Davis JAP 209	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Chemistry Dr. D. Davis JAP	Intro to English Comm. Ms. N. Didla OIAB 125	CLOSING PROGRAM ENB 100
10:15 am 10:30 am	**BREAK**	**BREAK**	**BREAK**	**BREAK**	
10:30- 11:45 **GROUP 1**	Intro to Biology Dr. M. Begonia JAP 320	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	Intro to English Comm. Ms. N. Didla OIAB 125	CLOSING PROGRAM ENB 100
10:30- 11:45 **GROUP 2**	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	Intro to English Comm. Ms. N. Didla OIAB 125	Intro to Biology Dr. M. Begonia JAP 320	CLOSING PROGRAM ENB 100
11:45 am- 1:00 p.m.	**LUNCH**	**LUNCH**	**LUNCH**	**LUNCH**	**RECEPTION**
1:00 pm- 2:45 pm **GROUP 1**	Intro to Physics Dr. R. Kalluru JSH 205	Intro to Cybersecurity Dr. A. Tanner JAP 125	Intro to Math Dr. R. Gentry JAP 106	Intro to Math Dr. R. Gentry JAP 106	**DISMISSAL**
1:00 pm 2:45 pm **GROUP 2**	Intro to Physics Dr. R. Kalluru JSH 205	Intro to Technology Dr. F. Tuluri J.Y.Woodard 202	Intro to Math Dr. B. Diatta JAP 108	Intro to Math Dr. B. Diatta JAP 108	

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ENB = Engineering Building

TABLE 14
BRIDGE TO SUCCESS FRIDAY SERIES
Friday, June 5, 2015

TIME	PRESENTER
9:00-10	Mr. Eric J. Abston, Substance Abuse/Impaired Specialist "Alcohol/Drug Abuse Prevention & Awareness" Dr. Terrence Wright, Instructor, Department of Biology "Success Strategies for STEM Majors"
10:00-11	Mrs. LaShinda Washington, HazMat/Radiation Safety "Laboratory Safety Awareness and the Importance of Following Regulations"
11:12:00	Rev. Elbert McGowan, Student Life, Campus Ministries
12-1:00	Ms. Lisa Bell, Debt Management Counselor, Office of Financial Aid "Receiving and Managing Financial Aid Resources"

Friday, June 12, 2015

TIME	PRESENTER
9:00-10	Dr. Loria Brown-Gordon, Associate Dean ,W.E. B. DuBois Honors College "Strategies for College Success"
10:00-11	10:00-10:30 Ms. Lakita Sims –Outreach, Program Services Mental Health Latasha Norman Counseling Center 10:30-11:00- Ms. Keisha Varnell, Coordinator, Student Leadership & Wellness "Sexual Assault Awareness and Prevention"
11:12:00	Mr. Rodney Hall, Recruiting Operations Officer, Department of Military Science "Military Opportunities"
12-1:00	Officer Demarius J. Cotton, Crime Prevention Officer, JSU Campus Police "Campus Safety"

TABLE 15
CESTEME Summer Bridge Program Participants
2011-2015

Year 1	Year 2	Year 3	Year 4
Chuks Agusiegbe	Joshua Bradford	Chastadee Dortch	Brandon Barner
Glenish Anderson	Savonte Burns	Rosie Dunlap	Mitchell D. Brown
Justin Austin	Claire Enow	Melody Holmes	Yasmine Carter
Jordan Barber	Kateeva C. Hodges	Razuli Littleton	Joseph Cheatman
Romero Finch	Briana Hoye	Alexis Moore	Chelsie B. Coleman
Shannon Gates	DaVaughn Jackson	Carmen Neal	Kholbi Coleman
Justin Griffin	Jasmine Jenkins	CeAhnna Pelt	Audranna Creswell
Jameria Hawkins	Kyla Marshall	Jada Ryals	Craig Ellis
Chelsea Houston	Daryl McClain	Kierra Watkins	Valencia Eubanks
Christina Jackson	Erik Mobley		Mariama Feaster
Douvez Jenkins	Catoria S. Mozee		Antonio Felix, Jr.
Markita Johnson	Ronald Mushi		Kaitlyn Harris
Terry Jones, Jr.	Felecia Paige		Lance Hayes
Ariel Martin	Casey Randolph-Fitch		Anthony Hunter
Michaela Martin	Damescia Ryhmes		DeBorah Luckett
Trenton Miller	Jacob Sterling		Anthony Moore, Jr.
Dominique Nance	Nyisha Washington		Dawud Jones-Mahammad, Jr.
Porsha Newell	Marco White		Daphine Ndishabandi
Jouslynn Owens	D'Marcus Whitlock		Malik Nelson
Richard Thomas	Gabrielle Wiggins		David Odom
Jarlisa Spann	Elizabeth K. Wilson		Maria Odom
Harold Sutton, Jr.			LaPorshia Porter
Michael Thompson			Joshua E. Ratliff
Oscar Williams, Jr.			Zacchaeus M. Simmons
			Malika E. Smith
			Erica Spann
			Keegan Stewart
			Mrquarion T. Tate
			Hervey Tchounwou
			Jasmine R. Thomas
			Roderick L. Thompson, Jr.
			Kreshawn Walls
			Keondra Williams